BUS. ADM. LIBRARY

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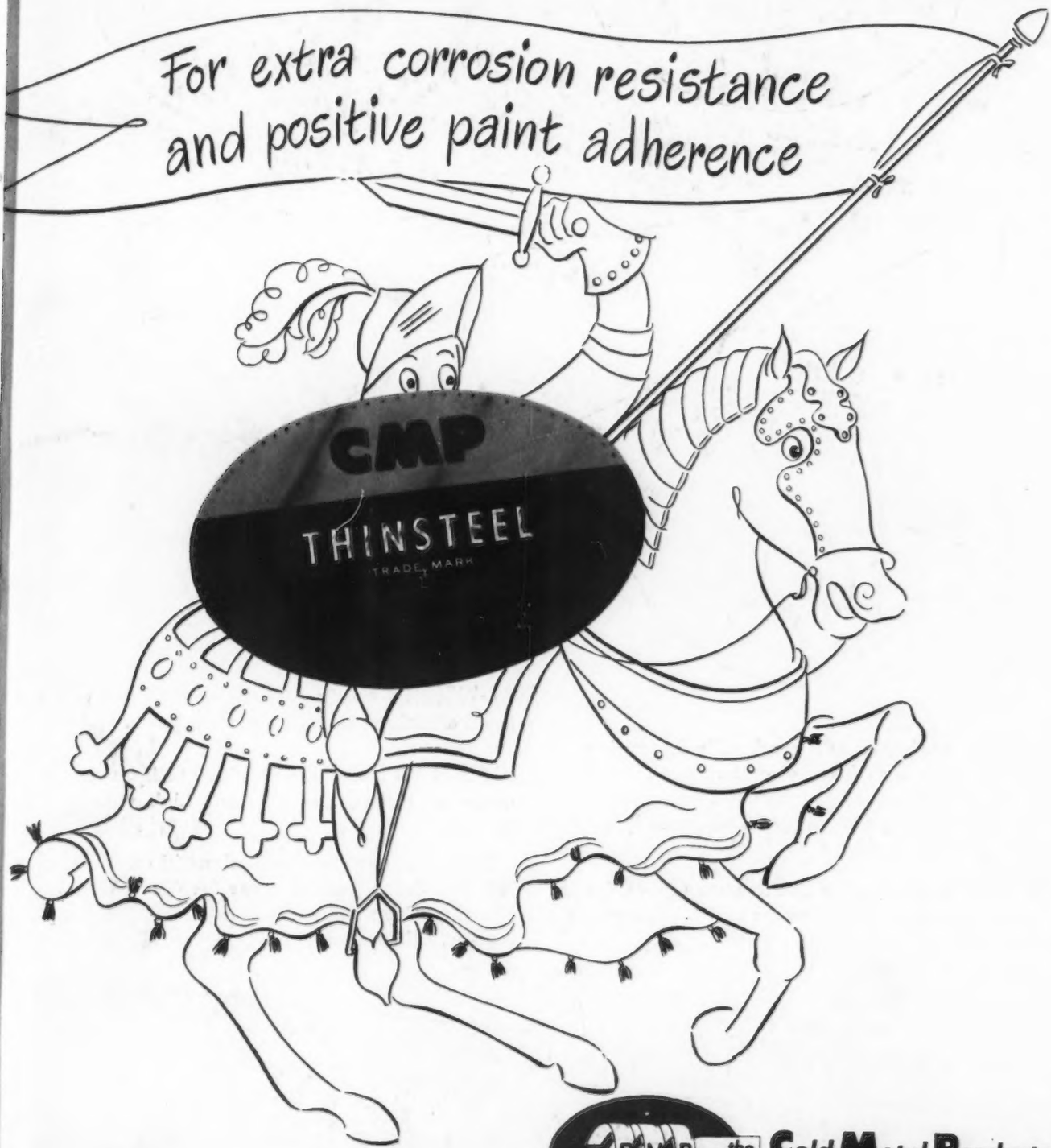
...mparison of Prices—p. 168

JUL 7 1949

The IRON AGE

JULY 7, 1949

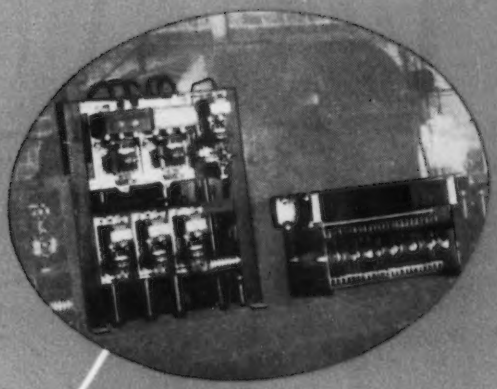
For extra corrosion resistance
and positive paint adherence

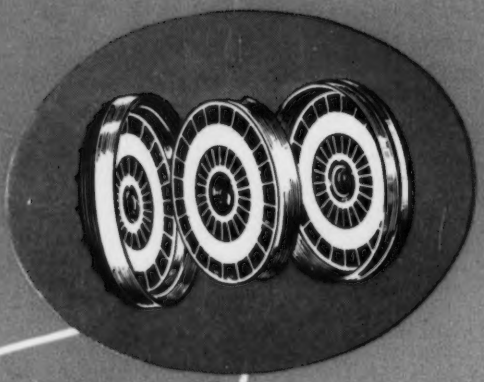


CMP the Cold Metal Products co.
YOUNGSTOWN 1, OHIO

NEW YORK • CHICAGO • DETROIT • ST. LOUIS • INDIANAPOLIS • LOS ANGELES

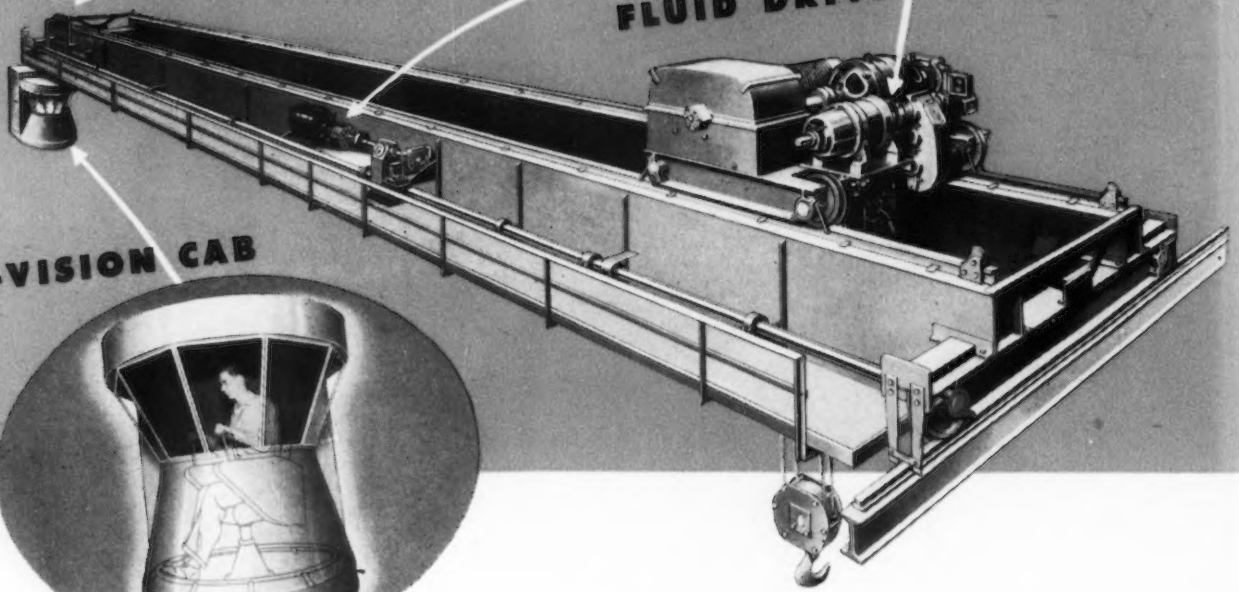
What's New in Cranes?





MAGNETIC CONTROLS

FLUID DRIVE



FULL-VISION CAB

Whiting engineers are continually improving crane design to take advantage of the newest developments of mechanical and electrical engineering. For example, today's Whiting Cranes embody the features illustrated above:

FLUID DRIVE to eliminate shock to motors and drive mechanism, reducing both motor and maintenance costs.

FULL-VISION CAB that permits the operator to see in all directions, including straight down.

MAGNETIC CONTROLS to get rid of bulky, awkward drum controllers, and eliminate high voltage in the cab.

For a more complete description of these advanced Whiting Crane features, write for Crane Unit 71. Whiting Corporation, 15601 Lathrop Avenue, Harvey, Illinois.

BUILDERS OF QUALITY CRANES

FOR OVER 60 YEARS

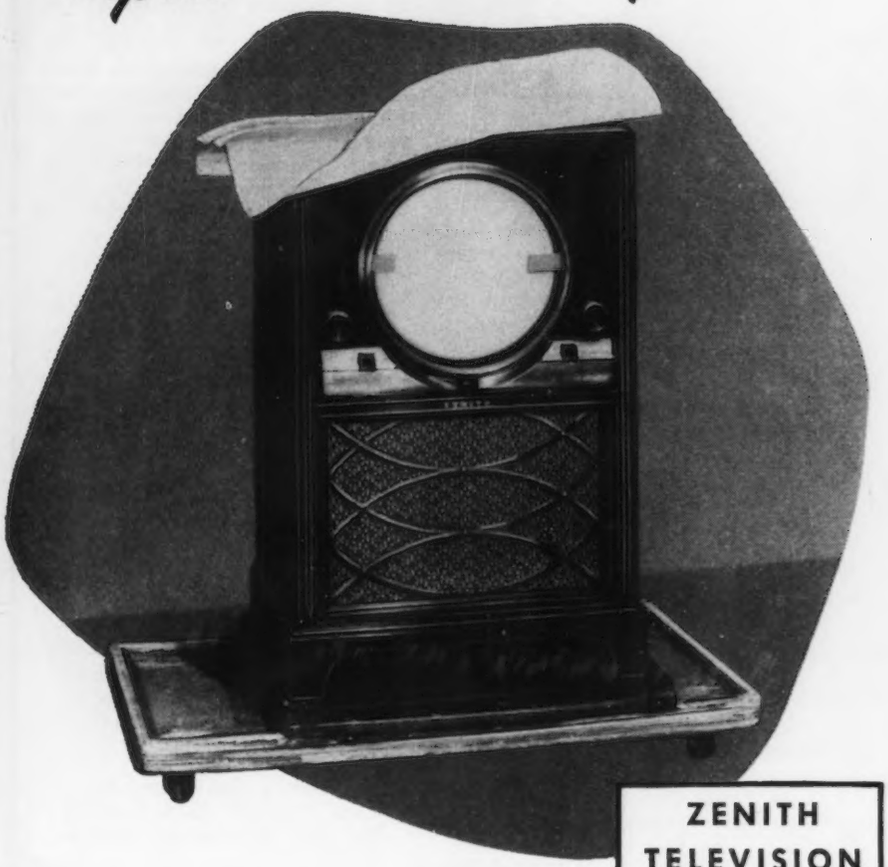
Dependable · · Quiet-Running · · Durable

WHITING

Overhead Traveling **CRANES**

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

Kimpak Float Packaging*



ZENITH TELEVISION

Cuts shipping costs— reduces damage in transit!

KIMPAK creped wadding gives your product better protection, yet saves you money, too! It's strong—to guard the most delicate articles; flexible—to adapt to any product; soft, clean and smooth—to provide the surest protection for finished surfaces! Yes, damage enroute is remarkably reduced with such safe, dependable protection!

KIMPAK reduces handling costs, because it's so easy to apply and pleasant to handle. And nothing else can equal the eye-appealing neatness of a KIMPAK wrapped product! Investigate now the many advantages of this newer, better packaging material. There's a specification to meet every requirement of the four basic methods of Interior Packaging . . . Surface Protection, Flotation Packaging, Blocking and Bracing, and Absorbent Packaging. For free booklet, send in coupon below.

1. Sheet of Kraft-backed KIMPAK is laid over top of cabinet and down sides.

2. Corrugated container is pulled down over KIMPAK-protected cabinet finish.

3. Assembly is up-ended, and container closed tightly at bottom over wood base frame protecting legs of cabinet.

4. Completed shipping package now provides full surface protection for the cabinet from container wall contact.

All photographs courtesy of Zenith Radio Corporation, Chicago, Ill.

Kimpak

REG. U.S. PAT. OFF. & FOREIGN COUNTRIES

A PRODUCT OF Kimberly Clark RESEARCH

CREPED WADDING

*T. M. REG. U. S. & CAN. PAT. OFF.

FREE BOOKLET

KIMBERLY-CLARK CORPORATION IA-749
Neenah, Wisconsin

Please send me free, the illustrated KIMPAK packaging guide.

Name.....

Firm.....

Address.....

City..... *Zone*..... *State*.....

PAGE

Stainless Steel

WIRE

ROUND

FLAT

OR

SHAPED

PAGE has been drawing stainless steel wire since the earliest development of stainless—for many manufacturers has become "Wire Headquarters."

Think of PAGE as a responsible source for wire—stainless steel, high or low carbon steel. Whatever your problem involving wire . . .

Get in touch with Page!

ACCO

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Pittsburgh, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

Fatigue Cracks

BY C. T. POST

Frustration

• • One of our favorite cartoons of all time is the Jimmy Hatlo masterpiece relating the subscription efforts of an unnamed publication.

Panel one shows the editorial department. On the wall hangs a sign: "Keep it terse. Boil it down. Say it in ten words."

Panel two shifts to the subscriber who has just received a renewal notice. The poor fellow is wading through reams of reasons why he should pay up to keep on the mailing list for another year.

Your favorite family journal, of course, has no major problem when renewal time rolls around. When the auditor finished checking the books early this year, he certified that slghtly over 80 pct of the loyal readers whose subs expired decided to stick around for another year.

The Casualties

• • What about the other 20 pct?

That's a problem to tax the imagination of any circulation manager. It is legend that the New York Times until recently sent out only one notice of expiration. Those who didn't pay up immediately were crossed off the list for further solicitation forevermore.

"After all," the circulation manager explained, "no one ever deliberately stops reading the Times. If they don't renew, they're either dead or have moved away."

Investigation seems to indicate the same reasoning to be valid for your f.f.j. Firms go out of business, executives retire or resign, engineers inexplicably shift to selling real estate, and sadly enough the grim reaper takes its share of those whose daddies fanned them as babes with early issues.

The Waverers

• • Your favorite family journal, having an extremely close knit brood of readers, counts its flock more carefully than ordinary publications. Boys will be boys, and corporations will be corporations. When the first dinner call goes out at renewal time, most of the family comes running. But if some are missing when heads are counted, the circulation department rings the gong again. Johnny or the Superplus Corp. may have been otherwise occupied, and they're both sure to be hungry for tidings of the industry in the months to come.

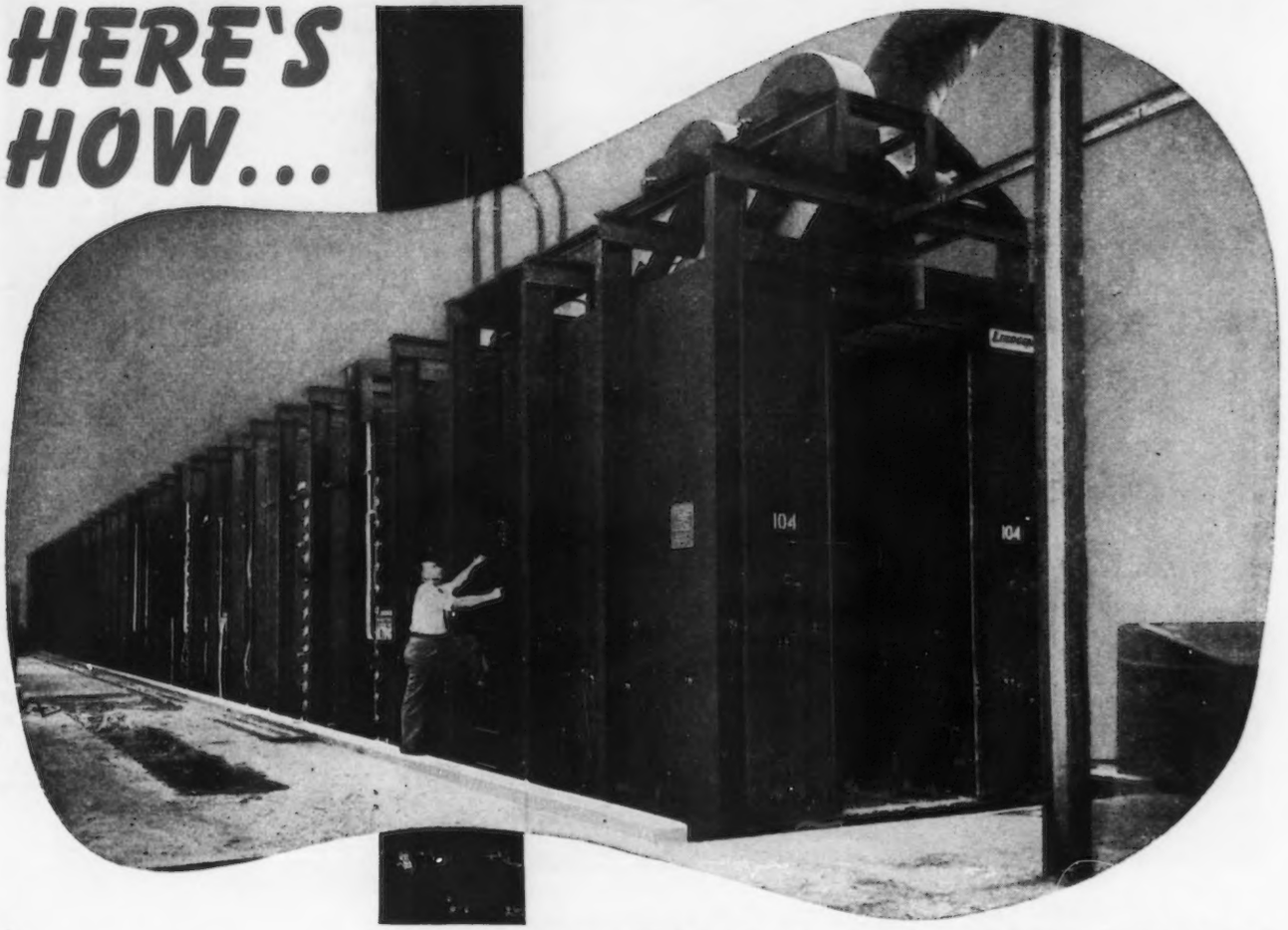
The editorial department, which cooks the meals, is called into conference. Have the menus been up to snuff, the circulation manager wants to know. Possibly the dallying readers are temporarily short on change, and the cashier's department gets into the act. If the family isn't completely happy, the publisher wants to know why. If you've ever been so forgetful as to let your renewal tarry too long, you'll hear from at least a half a dozen different members of the staff in inquiring, and ever so slightly hurt, tones.

This interest is deeply touching. Last week we had a letter from H. J. Fischbeck, supervisor of metallurgical and chemical processing, Pratt & Whitney Aircraft, who hadn't realized how much we cared. He wrote:

> "My check for the renewal went forward two days ago. Ever since I have regretted it.
> "In part it may summarize my regret to say:
>
> 1. Now I shall never know when I would have received the last solicitation for renewal.
>
> 2. I shall always be psychologically impaired by the unsatisfied desire to know whether that high level of inventive genius could be maintained through the series of renewal solicitations to the very end.
>
> 3. I shall not learn who else and how many of THE IRON AGE personnel together with their departmental staffs might show further personal interest in the renewal of my epochal subscription.
>
> 4. Forever unsatisfied, I shall ask myself: Who, at long last, would face the catastrophe that 80 pct of renewing subscribers had finally been depressed by my individual failure? Who would draw that last long sigh of regret and record it in moving expression which might bring me back among the safe and sane 80 out of every 100?"

It kind of pulled our heart strings. All this time, he didn't know we cared.

HERE'S HOW...



LINDBERG VITREOUS ENAMELING FURNACES PROCESS 58,000 LBS. PER HOUR OF LUSTRON HOMES

The new factory-built Lustron Home.

Two large electrically heated Lindberg Vitreous Enameling Furnaces process 58,000 lbs. per hour of Vitreous Enamel on steel (with tools).

These two Lindberg Furnaces, designed as an integral part of the Lustron assembly line, process an unusually wide range of architectural shapes for the new Lustron Home. These include wall sections 8′6″ x 24″, roof strips 8′6″ long, doors 6′10″ x 38″, framing of various sizes, mouldings as small as one inch in width, exterior panels and many other parts.

Each furnace is 180 feet long with a work chamber 11 feet high. Heating elements are grouped into 32 separately controlled temperature zones to allow accurate, flexible control of the temperature gradient. Traveling thermocouples periodically accompany the porcelain enamel work and assist the operator to establish and maintain the proper furnace burning conditions, and can, if necessary, provide a complete ware temperature record every 15 minutes. Other new design features of these furnaces are kinetic air plugs and electronic silhouettes.

Lindberg designs, fabricates, and installs a complete line of oil, gas, and electrically heated industrial furnaces for enameling, heat treating, and melting. Whether you need a small laboratory furnace, a standard production line model, or a large, specially designed and custom built installation, consult your local Lindberg representative . . . or write to Lindberg Engineering Company, 2452 West Hubbard Street, Chicago 12, Illinois.

LINDBERG FURNACES

Alloy Tube Division, The Carpenter Steel Company, is just one of the many manufacturers of stainless steel products that use the HF-HNO_3 pickling process. And for their HF, they look to Pennsalt. That's because Pennsalt HF acid fulfills exacting requirements!

Check these features of Pennsalt HF Acid for stainless steel pickling:

- **removes scale due to heat treating**
- **gives good finish**
- **economical**
- **easy to use**
- **uniform**

Pennsalt, for almost 100 years a *basic* producer of chemicals, delivers hydrofluoric acid to you at a fair price. That's because Pennsalt builds chemicals from the ground up. To help you with your pickling problems, Pennsalt maintains engineering service available to you at no cost or obligation. Check into Pennsalt products for use in your operation, write: Heavy Chemicals Division, Pennsylvania Salt Mfg. Co., Philadelphia 7, Penna.

PENN SALT chemicals

Pennsalt Anhydrous HF
- **Effective catalyst**
- **Condensation reagent**

Pennsalt Metal Cleaners
Corrosion-Resistant Cements and Paints

Dear Editor:

MORE NODULAR IRON

Sir:

Will you kindly send us eight reprints or tear sheets of the article entitled "Nodular Graphite Irons" which appeared in the April 28 issue.

M. CONSTANCE PARCHE
Librarian

Carborundum Co.
Niagara Falls

FUME CONTROL

Sir:

I would appreciate very much if you will kindly send one copy of the article on "Openhearth Fume Control," which appeared in Sept. 9, 1948, issue.

C. G. H. ROGAN

Hempstead, N. Y.

WRINKLE FINISHES

Sir:

Will you please send us pp. 78 to 83 from the Jan. 15, 1948 issue. We are interested in the article "Wrinkle Finishes" shown on these pages.

B. W. MANTLE
Chief Engineer

American Brake Shoe Co., Kellogg Div.
Rochester, N. Y.

TRADE NAMES

Sir:

Kindly send me one copy of a reprint for "10,000 Trade Names" as mentioned on p. 175, Jan. 2, 1947 issue.

L. D. DOHNS

Argonne National Laboratory
Chicago

CLAD STEELS

Sir:

Your book THE IRON AGE is circulated round the design section of our drawing office where I am employed. On looking through an old issue namely July 29, 1948, I read with interest the article by L. W. Williams on "How to Weld Clad Steels." This article was of particluar interest to me as I am employed in the section which calls for stainless and nickel clad vessels for chemical plant equipment. Unfortunately, the first part of this article has been mislaid and I have been wondering if you could supply me with this article in full or pamphlet form.

J. M. WRIGHT

Acova
Worcestershire, England

● It's in the mail.—Ed.

INTERNESHIP IN INDUSTRY

Sir:

In connection with a new senior course in the Department of Metallurgical Engineering, we have been quite successful this past year in giving senior students an introduction to their

If you use Alloy Steels, you'll need this *FREE BOOK!*

HERE's a handy booklet which gives you quick answers to a lot of questions on both commercial and aircraft quality alloy steels.

Do you want to know what grade to order?
This booklet tells you.

Do you want to know if the size and grade you need are available?
All you have to do is check the comprehensive information contained in the listings.

Do you want to know the cost of any particular alloy steel?
There is a complete price list included.

Send for your free copy of this valuable, informative, and time-saving Inventory and Price List. Just fill in and return the convenient coupon. Do it right away.

United States Steel Supply Company
Dept. DD-79, 208 S. La Salle St., Chicago 4, Ill.

Without obligation on my part, please send me a FREE copy of your handy booklet, "Alloy Steel Inventory and Price List."

Name.....Title.....

Firm Name.....

Address.....

City.....Zone....State.....

SYMBOL OF SERVICE FOR STEEL USERS

UNITED STATES STEEL SUPPLY COMPANY
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STEELS
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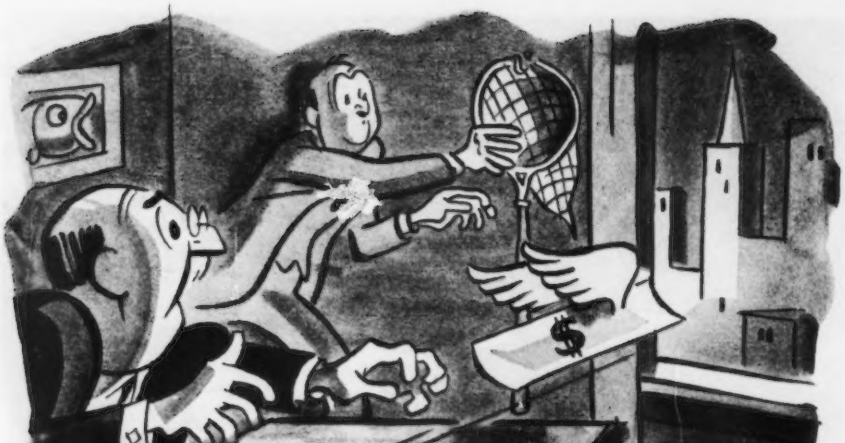
UNITED STATES STEEL



"Quick, Plunkett... the NET!"

Yes, indeed! When profits show signs of taking flight, it pays to look to the net—NET sales and NET costs.

* * *

Pre-coated Thomas Strip is a direct route to cost reduction—a short-cut to economical production, because it eliminates several costly production steps that consume time, labor and valuable floor space.

Take COPPER-COATED Thomas Strip, for example:

Its uniform *pre-coat* of copper on steel helps streamline your production to two essentials—fabrication and assembly. Little cleaning or buffing is needed. The non-peeling, non-cracking copper coating is unharmed in fabrication; it protects parts in process against corrosion, and serves either as the final product finish or as a ready base for further plating. It lubricates dies, increases die life and cuts retooling costs.

Looking to your NET? It will pay you to test *pre-coated* Thomas Strip in your plant and processes. Write us for more information, for samples and for metallurgical assistance—without obligation.

THE THOMAS STEEL COMPANY
WARREN, OHIO
Specialists in Cold Rolled Strip Steel

COLD ROLLED STRIP STEEL

Electrocoated with Nickel, Copper, Zinc and Brass • Hot Dipped Tin and Lead Alloy • Lacquer Coated in Colors • Annealed and Tempered Spring Steel • Alloy Strip Steel • Uncoated Strip Steel • Produced to Your Specifications.

Thomas Strip

SPEEDS PRODUCTION... CUTS COSTS

interneship in industry. The particular course involves an introduction to the economic viewpoint, the growth of industries in this country and the correlation of the profit motive in metallurgical practices.

I believe that THE IRON AGE's new Basic Marketing Data volumes would furnish considerable aid in certain aspects of this course and I am wondering if I may be put on the mailing list for such data books?

J. W. LUDEWIG
Associate Professor
Carnegie Institute of Technology
Pittsburgh

● Copies of Basic Marketing Data are on their way with our compliments.—Ed.

LIQUID STAINLESS

Sir:

The issue of November 25, 1948 contained an article with reference to a liquid stainless steel paint manufactured by Lockrey Co. As we are unable to find the address of this firm we ask that you kindly advise us of same.

R. W. PIHL
Purchasing Department
Mechanics Universal Joint Div.
of Borg-Warner Corp.
Rockford, Ill.

● The address is College Point, N. Y.—Ed.

COMPLETE DIRECTORY

Sir:

I should like to thank you for the copy of the "Directory of Tool Steels," which I received this morning. This is the most complete directory of these steels we have ever had in this department and it will be of great use to us as a source of reference.

W. I. PUMPHREY
Dept. of Metallurgy
University of Birmingham
Edgbaston, Birmingham
England

PICKLING FOG

Sir:

Will you kindly send me tear sheets on the article "Eliminating Pickling Room Fog" which starts on p. 79 of the May 26, 1949 issue of your magazine.

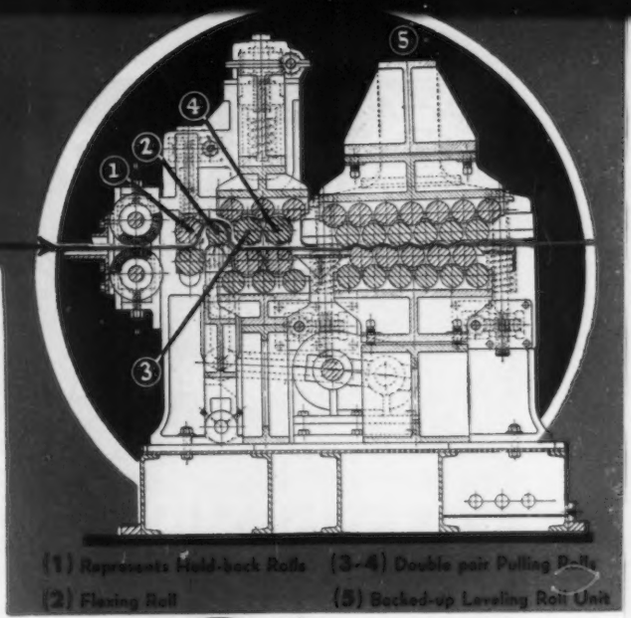
E. H. FORSSTROM
Asst. Plant Manager
Allegheny Ludlum Steel Corp.
Brackenridge, Pa.

RADIOACTIVE TEST

Sir:

I am interested in securing more information concerning a Newsfront paragraph in the May 24, 1949 issue. This paragraph reads as follows: "Radioactive chemicals are being used to test the effectiveness of detergents as metal cleaners. Method utilizes C14, an atomic energy byproduct which emits beta rays, or electrons. Developing company says it can detect traces of soil beyond the sensitivity of

BUDD-McKAY



(1) Represents Hold-back Rolls (3-4) Double pair Pulling Rolls
(2) Flexing Roll (5) Backed-up Leveling Roll Unit

IN operation, a sheet is fed between the brush rolls, the hold-back rolls and into the bite of the pulling rolls which draw it into the machine. After the sheet is securely gripped by the pulling rolls, the flexing roll is automatically shifted from its idle position below the pass line into its upper, or working, position as indicated by (2). This causes the sheet to go into a full quarter turn around the exit side of the hold-back rolls (1), a reverse half-turn upward over the flexing roll (2), and another reverse quarter turn downward around the first top pulling roll (3).

The triple bending, or flexing, of the sheet as it passes in and out of the loop kneads the steel and imparts the desired amount of cold plasticity. A second set of pulling rolls (4) directs the sheet into the backed-up leveling rolls where it is flexed repeatedly and finally ejected a flat sheet.

The progressive advancement of the bend throughout the area of the sheet, followed by a pass through the staggered leveler rolls, permits the flexing to be carried much further beyond the elastic limit of the steel than is possible by any roller leveler, thus affording greater freedom from stretcher strains.

While conventional four-high roller leveling machines assist fabricators in securing a suitable texture in steel sheets, yet the mechanical work accomplished is not sufficient to make the sheet altogether immune from surface blemishes. The flexing action of the BUDD-McKAY PROCESSOR frees the grain structure so that, when the steel is drawn under dies to the desired contour, stretcher strains do not occur.

Sheets processed by the BUDD-McKAY PROCESSOR remain free from strains longer because of the extreme flexing and thorough roller leveling, but subsequent forming operations should follow soon after the processing if its full benefits are to be obtained, as a lapse of time causes the sheet to display a tendency to return to its initial condition.

Sheet PROCESSING MACHINE

WITH THE NEW BUDD-McKAY SHEET PROCESSING MACHINE it is possible to render sheets free of stretcher strains. Sheets processed on this patented processing machine have far superior stamping and drawing qualities, and retain these qualities much longer, than sheets processed by any other method.

BUDD-McKAY (PATENTED) PROCESSOR

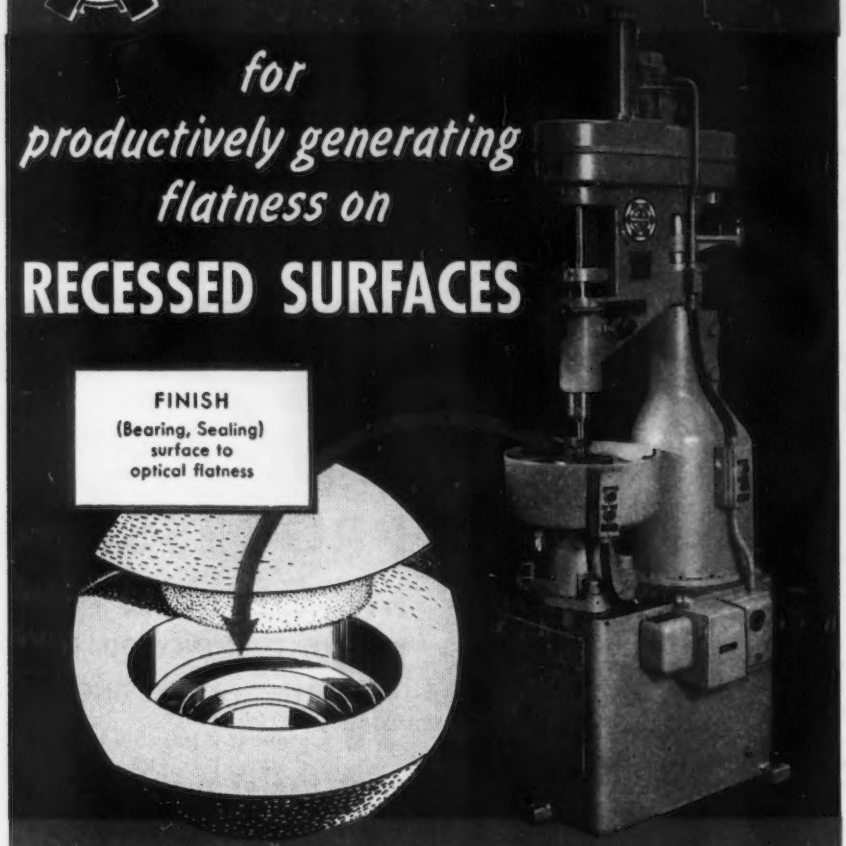
The **McKAY MACHINE** *Company*
ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT
YOUNGSTOWN, OHIO
ASSOCIATED COMPANY
The WEAN ENGINEERING CO., Inc. • WARREN, OHIO

MICRO MATIC

MICROFLAT

for productively generating flatness on

RECESSED SURFACES



● Microflat machines may be equipped to finish recessed surfaces.

The location of a surface does not limit the application of the MICROFLAT machines. Any surface that can be machined can be finished with this equipment. The surface finish and flatness generated can be controlled and held to any specified requirement.

The machine shown above is equipped with a timer and an air cylinder. The operator loads the part into the fixture and starts the cycle. The fixture rotates, the bonded abrasive finishing surface oscillates and rotates. At the end of a predetermined time cycle the spindle automatically withdraws. Production is 300 pieces per hour.

MICROMATIC HONE CORPORATION
8100 SCHOOLCRAFT AVENUE, DETROIT 4, MICHIGAN.

even the most refined of present methods which depend on physical measurement."

C. D. FOULKE
Research Metallurgist
Weirton Steel Co.
Weirton, West Va.

● Monsanto Chemical Co., St. Louis 4, Mo., uses this technique.—Ed.

INSERT TOOLS

Sir:

The article "Carbide Insert Cutting Tools" in the May 12, 1949 issue of IRON AGE was very interesting and well written. Request that two sets of tear sheets be sent so that we may have them for reference.

JOHN G. GRAMZOW
Lt. Col., Ord. Dept.
Assistant
Dept. of the Army
Office of the Chief of Ordnance
Washington

FIRE BRICK GRINDERS

Sir:

We would appreciate a list of manufacturers of a grinder suitable for crushing fire brick.

HOWARD R. HEATH
Foundry Superintendent
Sumner Iron Works
Everett, Washington

● We are forwarding a list of such manufacturers.—Ed.

SPRAY PAINTING

Sir:

Please send us three tear sheets of the article "A Control System for Spray Painting" which appeared in the May 19 issue.

O. C. OLSEN
Development Engineer
Vendo Co.
Kansas City, Mo.

KIRKSITE MOLDS

Sir:

We would appreciate receiving a tear sheet of "Kirksite Molds for Plastics," April 20, 1944.

STAN HYMAN
Research Dept.
American Merri-Lei Corp.
Brooklyn

PRECISION CASTING

Sir:

Will you please supply two copies of the following publication, "Precision Investment Casting—Lost Wax Process."

H. H. COLLINGS
Central Mailing & Records Dept.
Bristol Aeroplane Co., Ltd.
Bristol, England

● Copies are available at $1.00 each.—Ed.

COMPARABLE TOOL STEELS

Sir:

In the April 28 issue we noticed a large sheet on "Comparable Tool Steel

Textile roll with body of Meehanite Metal and cover of bronze, both cast centrifugally by Shenango-Penn to assure exceptional strength and life. Shenango-Penn offers modern machining facilities for completely finished parts (as shown) or any stage of completion desired.

How this textile roll might smooth out a problem for YOU

IF SYMMETRICAL parts (such as sleeves, liners, rings, bushings, rolls and roll covers) figure in the machinery you build or operate, the above roll has qualities that could probably save you time and money.

The roll's body is Meehanite Metal—a big advantage in itself. The cover is bronze. Both are Shenango-Penn *centrifugal* castings. This means fine-grain, *pressure-dense* metal, assuring exceptional strength and hardness, and permitting the finest kind of finish. You just can't beat this combination for resistance to wear, breakage and distortion . . . for *long life!*

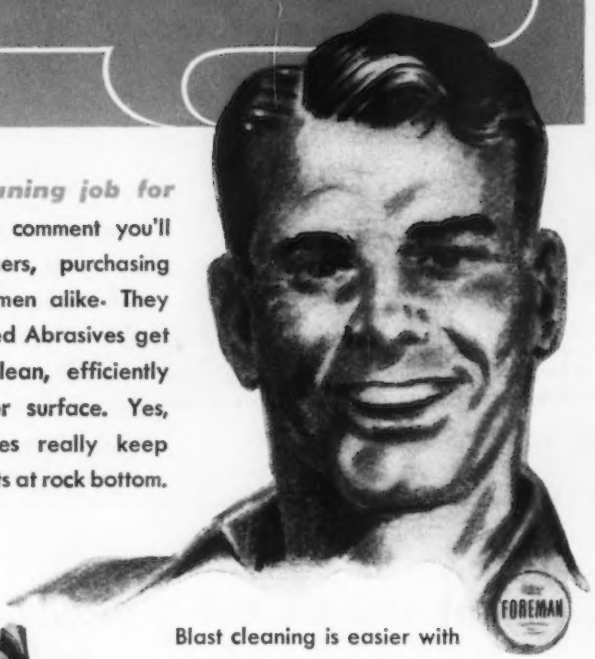
That's why Shenango-Penn is continually producing symmetrical, annular and tubular parts, large and small, for many services in many industries. Send for free bulletins on either ferrous or non-ferrous made-to-order centrifugal castings or on *centrifugally cast* bronze bushing stock in standard sizes.

SHENANGO-PENN

SHENANGO-PENN MOLD COMPANY
578 WEST THIRD STREET • DOVER, OHIO
Executive Offices: Pittsburgh, Pa.

ALL BRONZES • MONEL METAL
NI-RESIST • MEEHANITE METAL®

"CERTIFIED"
does a better
cleaning job for us



A better cleaning job for us... that's the comment you'll hear from owners, purchasing agents and foremen alike. They all agree, Certified Abrasives get castings really clean, efficiently produce a better surface. Yes, Certified Abrasives really keep blast cleaning costs at rock bottom.

Blast cleaning is easier with Certified. Both Samson Shot and Angular Grit can be used over and over again. With them on your job you get *more work done ...every day.* Order Certified today for better cleaning!

Always specify "Certified"

ACCEPTED AND USED FOR OVER 55 YEARS.

PITTSBURGH CRUSHED STEEL CO.
PITTSBURGH, PA

STEEL SHOT AND GRIT CO.
BOSTON, MASS.

Trade Names." The information should be of considerable value to our heat treating departments, and if you could let us have three more copies that cooperation would be appreciated.

R. C. HALURKEN
Purchasing Agent

R. J. Reynolds Tobacco Co.
Winston-Salem, N. C.

● While they last, reprints of this popular chart are available to readers at 15¢ per copy.—Ed.

VERSATILE

Sir:

We would appreciate it very much if you would send us the tear sheets for the following articles appearing in your magazine: "When and How to Use Carbide Insert Tools," May 5, 1949; "Effect of Contamination on Quench Media," May 5, 1949; "Heat Treatment of Aluminum Casting Alloys," March 5 and 10, 1949; "Getting the Most Out of Friction Type Bearings," March 5, 1949, and "Metallurgy and Heat Treatment of Cutting Tools," January 13, 1949.

E. C. WALLACE
Metallurgist

Barber-Coleman Co.
Rockford, Ill.

HAND MILLS

Sir:

If convenient the writer would like to secure about 24 reprints of the article "Hand Mills Face Foreclosure of War-Induced Lease on Life," by G. F. Sullivan your Pittsburgh Regional Editor. The article appeared in the April 21, 1949, issue, pp. 117 and 118.

R. T. REARDON
Works Laboratory

General Electric Co., Apparatus Dept.
Schenectady, N. Y.

BERYLLIUM-COPPER

Sir:

It would be very much appreciated if you would send us a reprint of the article listed in the April 15 issue of Cado as No. 14-8-75, titled "How to Heat Treat Beryllium-Copper," by J. T. Richards.

RICHARD E. CARPENTER
Staff Asst. to Director of Engineering

Consolidated Engineering Corp.
Pasadena, Calif.

NODULAR IRON

Sir:

We would appreciate your forwarding to the attention of our assistant chief engineer, reprints of the following: "Ductile Cast Iron—A New Engineering Material," p. 76 of your Feb. 17, 1949, issue, and "Magnesium Treatment for Nodular Graphite Cast Iron," p. 97, Feb. 24.

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The IRON AGE

Vol. 164, No. 1 July 7, 1949

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July 7, 1949

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Where We Stand

"DEPRESSION," in the lexicon of semantics, is a bad word. It implies mass unemployment, financial panic, bankruptcies, government deficits, idle plants, widespread economic hardships.

According to the Reds, it is also the final gasp of capitalism before rigor mortis sets in. Hence, the desperate search for some other word to describe a decline in business. It is "a recession," "an adjustment," "a business retreat from untenable forward positions."

This need not be altogether a contest in words, a search for fine distinctions. A host of tangible gages are available with which to ascertain the prevailing level of business. At the time of writing, the steel rate is about 80 pct. This is the first time since the end of the war that it has dropped so low because of declining demand. Miscellaneous freight traffic on a carload basis is 14 pct. below last year. Auto output is running 25 to 30 pct better than a year ago. Power output is 4 pct ahead of 1948. Oil production is down about 11 pct but gasoline consumption is up 5 pct. Residential building is falling off, while engineering construction is holding up, and in recent weeks has exceeded the same period a year ago. Department store sales are off 8 pct from last year. The combined index of industrial production of the Federal Reserve Board is off about 13 pct at the end of June from the peak reached last November.

This does not yet add up to a depression. The changes which have taken place have all been from unprecedented boom levels. Department store sales are still almost three times the prewar volume. *There are still approximately 10,000,000 more jobs than were held during the best year of the prewar period.* In other words, if the present computed total of 3.2 million unemployed were increased to 13,000,000, there would still be more men and women holding better jobs than in 1929 or 1940. The American public is using 168 pct more electric power and 105 pct more gasoline than it used ten years ago.

Although some industries, notably textiles and paper, are in a definite slump while others are slipping, it is not yet correct to term the current business decline a depression. If the forces of the economy are moving away from their forward positions, they are doing so in an orderly fashion. It has not yet become a rout. There is no panic.

This view is further sustained by a comparison with 1920-21 and 1937-38. The present decline has gone a little more than six months. During a similar period following the slight bulge of June 1919, the F. R. B. Index of Production slipped 22 pct. From August 1937 to February 1938 this same measure of business activity faded 30 pct. During a similar interval on the present occasion, from November 1948 to May 1949, physical volume of business dropped 11 pct.

While this decline is certain to go further, there is as yet no occasion for hysteria. There is no reason for lowering the flag of free enterprise and hoisting the pennant of socialism. American productivity and living standards have not yet been dented.

Joseph Stagg Lawrence

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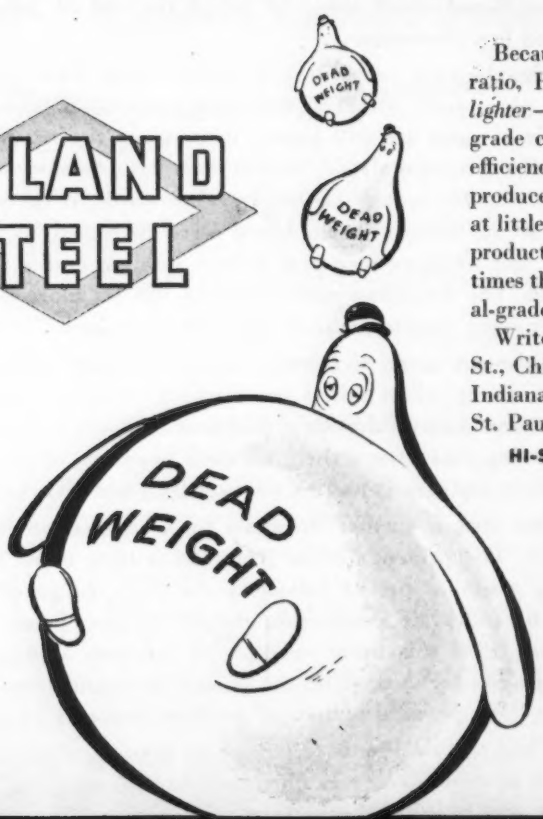

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► A new peacetime use for the jellied fuel used in flame throwers may simplify and speed up cupola lighting. It is already being used successfully for lighting large coal fired furnaces. In the cupola this thickened diesel engine distillate would eliminate the difficulties in starting up with wood.

► Elimination of certain extras that were charged by some steel companies during the past few years means that they've dropped some prices by as much as $10.00 a ton--a fact which they have been explaining to USWA local union negotiators for the past few weeks. They've been hoping thereby to get a better contract than some of the companies that haven't had to adjust extras to remain competitive.

► Gas turbines for automobiles have not been ruled out of engineering thinking although at present their potential advantages are outweighed by such factors as high fuel consumption, size, exhaust problem, lack of braking torque and the relatively low power needed in cars. If these problems can be licked, these advantages should show up well: Maximum torque at standstill, simpler transmission, clutch, electrical and lubrication systems.

► Federal Reserve Board action last week easing credit not only boomed government securities but moved a lot of high grade corporate bonds which investment bankers had been trying to sell for some time. The credit policy change is a government shot in the arm and it is believed that other needles with more powerful serums are ready to follow.

► Reports that steel order cancellations are falling off are true but can be misleading. The nearer companies get to having no backlogs the less there is to cancel.

► A temperature-sensitive paint with the covering and weather-resistant properties of a high quality outdoor paint can be used to signal the approach of the safe upper temperature limit for a variety of industrial processes. It is made in two grades, one of which changes color at about 180°F while the other shows a color change in the neighborhood of 205°F.

► Second guessers are now able to point out that mechanical tubing sales predicted the current decline in steel business last fall. Because this item, like hot-rolled steel bars, finds its way into a great many metal products its performance will be carefully watched as a steel barometer.

► Preliminary research shows that certain fatty acids and alcohols modify oil-water-sandstone interfaces, aiding in the removal of oil trapped in the stone of pumped-out wells. Cost is still prohibitive but it is expected that the technique can be perfected so that millions of barrels of oil can eventually be recovered from what are now dry holes.

► Steel users are increasing pressure on their suppliers to maintain high standards of drawing quality and finish. During the steel scarcity, when sheets were often bought from questionable sources, fabricators lost a lot of money on sheets that would not draw properly or wouldn't enamel. Some auto firms paid more than $20 a ton to finish fenders prior to painting.

► Nucleus of new efforts to revive the steel cartel is a series of talks between Belgian and Luxemburg steelmakers. Some agreement may already have been reached on: (1) Reestablishing selling organizations; (2) maintaining home prices; and (3) agreeing on export prices. Quotas may not yet have been fixed.

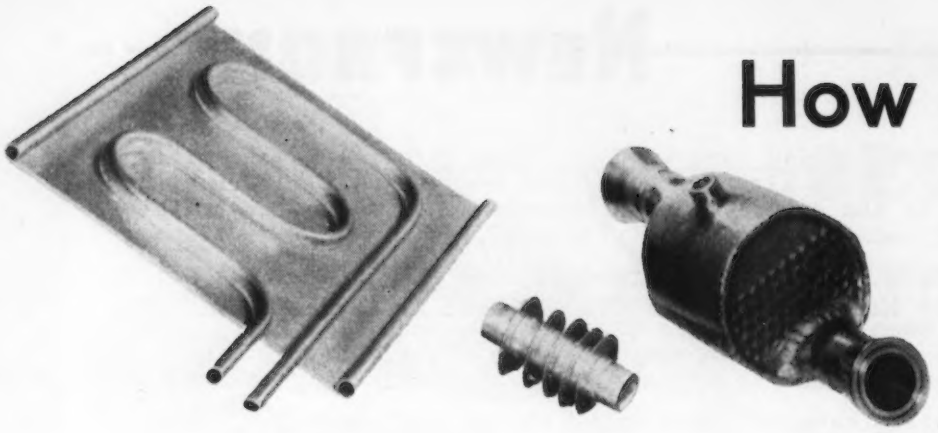
Steel leaders in this country don't want anything to do with it. The Steel Export Assn. which operated in the international cartel before the war is now defunct. American steel men disagree with European thinking on the grounds that it is commercially restrictive, as ever.

► The automotive transmission battle is getting warmer. Possibility that Kaiser-Frazer and Nash, in addition to Lincoln-Mercury, may adopt Hydra-Matic has been aired. Chevrolet and Cadillac will introduce new or improved self-shifting devices in the late fall. Studebaker should fall in line soon thereafter.

► Load-bearing concrete building units faced with porcelain enamel are on the market. The enamel facing can be furnished in a number of surface textures and in plain or multi-color finishes.

► Reports indicate that the new General Motors "B" body (for Olds 88, Buick and small Cadillac) is already in limited production with public announcement by Buick expected next month. It's said to have more headroom and a lower silhouette.

How to Braze



ALUMINUM assemblies such as these are brazed without difficulty. Torch and furnace techniques were used in brazing these parts.

Brazing of aluminum assemblies is ideally suited for long production runs and results in joints comparable in strength with welded assemblies. Basic information on how to braze aluminum is given in this article, including such factors as types of aluminum which can be brazed, methods of brazing, types of filler material, fluxing procedures and cleaning.

BRAZING can be applied to aluminum products just as successfully as to parts fabricated from other metals. The method is ideally suited to the mass production of identical units, and the strength of brazed joints is comparable with welded joints while the process is cheaper than welding.

Brazing is particularly useful in joining complex structures made up of two or more wrought aluminum parts. The joints are neater than welded joints and require less finishing. Parts too thin to be welded by either torch or arc methods may be successfully brazed. The corrosion resistance of brazed joints is comparable with that of welded joints.

In brazing aluminum, as in the brazing of other metals, temperatures employed are high enough to melt the filler alloy but not so high as to cause any appreciable melting of the base metal. These temperatures are intermediate between those required for soldering and those used in welding; and are close enough to the melting point of the base metal that accurate control is required.

The filler materials used in brazing are aluminum alloys, so that brazed structures have a uniform appearance with no difference in color at the joints. Thus brazed aluminum assemblies may be successfully anodized after the brazing operation has been completed.

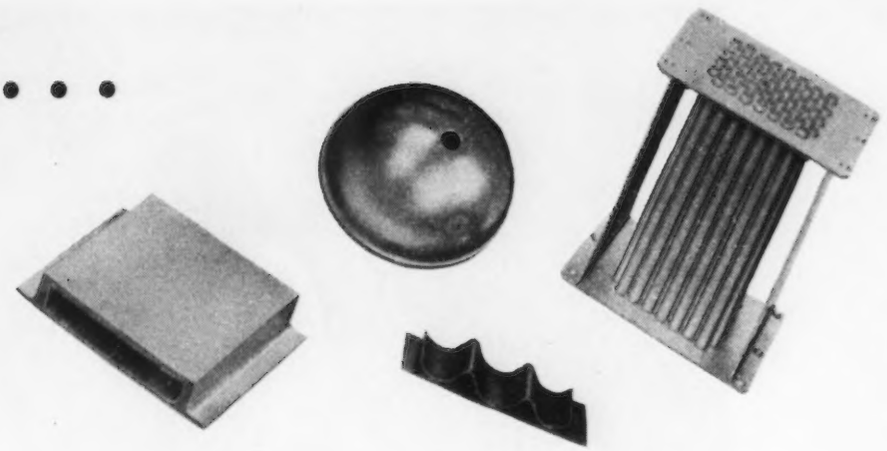
Brazing can be commercially applied to only wrought alloys 2S and 3S of the non-heat-treatable type, and 53S and 61S heat-treatable alloys. However, procedures and materials are being developed for other alloys and are expected to broaden the usefulness of the process. Two types of aluminum brazing sheet also are available. These are composite sheets with alloys similar to the foregoing alloys as the base metal and a thin coating of filler alloy bonded to either one or both sides. A few aluminum casting alloys also can be satisfactorily brazed, but the process generally is not applied to castings because of the low melting range of most casting alloys.

Types of joints that can be most successfully brazed are lock seam, tee, line contact, and lap, as shown in fig. 1. Butt or scarfed joints usually are not suitable to brazing. Filler materials are applied in wire, ring, or shim form, depending on the nature of the joint. When temperatures high enough to melt the filler alloy are reached, the filler flows by gravity and capillary action into the joint where it alloys with the surfaces of the base metal, forming a solid aluminum alloy joint. The volume of filler metal used should be sufficient to form generous fillets. Wire of $\frac{1}{8}$ in. diam is satisfactory for most joints. A flux must be used with practically all operations in order that the filler alloy may thoroughly wet the joint surfaces and form a good bond.

Clearances must be provided at the joints to allow space for the flow of filler metal. For laps

Aluminum . . .

By FLOYD A. LEWIS
Aluminum Assn., New York



of less than ¼ in., clearances of from 0.006 to 0.010 in. should be allowed; up to 0.025 in. should be provided for longer laps. Optimum clearance for any structure should be determined by trial. Clearances are not required when brazing sheet is used.

Three general types of brazing are employed with aluminum, depending on the method of applying the heat. These are torch, furnace and dip brazing. Torch brazing is done in much the same manner as torch welding. When furnace brazing is used, the parts to be joined are heated to brazing temperature in furnaces of conventional types. In dip brazing, the parts are immersed in molten flux.

Simple joints may be easily brazed by means of a torch, as shown in fig. 2. Any common welding gas may be used such as oxyacetylene, oxyhydrogen, or oxygen-natural gas. More complicated structures, however, can best be brazed by either the furnace or dip method. Furnace brazing is more commonly employed, but dip brazing has been used for some complicated and difficult jobs with better results.

Standard furnaces of either batch or continuous types may be used. They must be capable of continuous operation in the range 1000° to 1200° F and should be provided with automatic control that will maintain constant temperature ±5°.

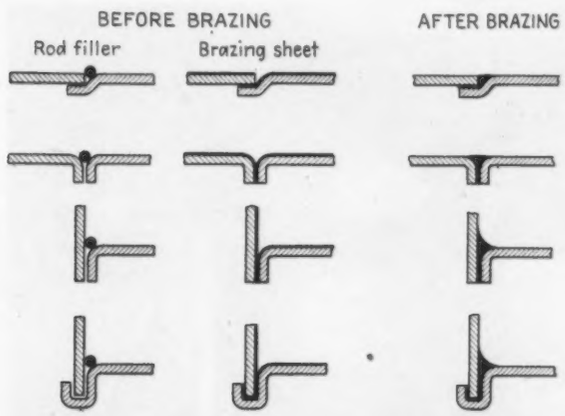


FIG. 1—Various types of joints for brazing, showing the use of both wire filler material and brazing sheet. Clearances are required where filler metal is used, but none are necessary where brazing sheet is employed.

Either electric or fuel-fired furnaces may be employed. Baffles must be used with electric furnaces to protect the parts from over-heating where they are in close proximity to the heating elements. Drops of molten flux must not be permitted to come in contact with the elements. Where fuel-fired furnaces are used, they should be designed that the products of combustion do not come in contact with the parts being brazed. Free circulation of the air within the furnace is desirable for uniformity of heating of all parts in the charge. A typical furnace brazing operation is shown in fig. 3.

Although dip brazing is newer than the other methods, it offers some interesting production economies. No separate application of flux is required as in torch and dip brazing. It cannot be used, however, for closed parts that will float or where drainage of the flux after brazing cannot be provided.

Ceramic pots are ordinarily used and the parts are loaded onto racks made up of nickel or pure aluminum wire to avoid contamination. The pots should be large enough so that the temperature does not drop too much when a charge is immersed. As in furnace brazing, automatic temperature control should be provided having an accuracy of ±5°. Preheating the parts before immersion will increase the speed of the operation and give smoother joints.

Correct brazing time and temperature for any given job can best be determined by trial. The required temperature will depend on the alloy from which the parts are fabricated and on the filler alloy used, but will fall within the range 1050° to 1185°F. The thickness and shape of the part will also have some influence on brazing temperature.

The time required for furnace or dip brazing depends largely on how long it takes to raise the temperature of the parts to the brazing level. This in turn will depend largely on the thickness

FIG. 2—The tight fitting cover of this aircraft deicing unit is pressed into place and girl operators complete the assembly by torch brazing. The unit is then tested hydrostatically.

of the parts. After the parts have been brought up to brazing temperature, a period of from only 2 to 8 min is required to complete the operation. Parts only 0.008 in. thick have been brazed in a total furnace time of 4 min, and up to 45 min or more may be required for thick parts.

As brazing requires heating alloys 2S and 3S above their annealing temperatures, such brazed parts will have the properties of annealed metal regardless of the temper before brazing. Therefore, the design of brazed parts to be made of these alloys must be based on the allowable stresses for the annealed or soft temper.

Where greater strength is required, one of the heat-treatable alloys or brazing sheets may be used. Heat treating must be carried out after brazing. Either solution heat treatment or solution treatment followed by precipitation hardening for greater strength may be employed. Satisfactory strength can often be developed in furnace or dip brazed parts fabricated from heat-treatable alloys by simply quenching the parts from brazing temperature as they are removed from the furnace or pot. This may be followed by precipitation treatment if greater strength is required.

Assemblies to be joined by furnace or dip brazing should not include parts having a metal thickness greater than ½ in. or less than 0.006 in. A wide range of thicknesses in any one assembly should be avoided because stresses arising from uneven heating may distort the parts.

FIG. 3—Furnace brazing requires careful control of temperature, fluxes and brazing metal, but brazed assemblies are uniform and the method is used where high production is required. After brazing this assembly is scrubbed in hot water to remove flux material.

The design should permit easy assembly of parts prior to brazing, especially where high rates of production are involved. Closed assemblies should be designed so as to permit the escape of gases evolved.

Wherever possible, parts to be joined should be designed so as not to require the use of jigs or fixtures. Correct alignment may be obtained by the fit of the parts, by beading or clinching, or by incorporating projections into the design at appropriate points. In some assemblies, the use of rivets may be feasible for this purpose, and in others tack welding such as shown in fig. 4 may be employed.

Where the use of jigs cannot be avoided, certain precautions must be exercised. Steel, stainless steel, or carbon are the materials usually employed. Because of differences in thermal expansion between these materials and aluminum, jigs must be designed so that the parts are not forced out of alignment during brazing. Aluminum jigs may be used for furnace brazing if made of any alloy having a melting point above the brazing temperature and shaped so that there is no contact with molten flux or filler metal. Aluminum jigs cannot be used with dip brazing or with brazing sheet coated on both sides.

Commercial fluxes are available for all brazing methods and for all types of brazing jobs. They are supplied in powder form, and their melting temperatures are lower than those of the filler alloys. To meet the requirements of various brazing operations, however, they vary somewhat in both melting temperature and chemical characteristics. The greatest latitude in the selection of a flux is possible in furnace brazing.

A low melting point flux that is chemically active, so as to produce maximum flow of metal into the joint, is best for torch brazing and for general purpose furnace brazing. For operations involving temperatures in the higher ranges, a higher melting point flux should be used. In brazing thin wall assemblies and where smooth surfaces of the brazed parts are important, a flux that is less active chemically should be used. The action of such fluxes is confined almost entirely to removal of oxide, leaving the metal surfaces practically unaltered. One of the less chemically active fluxes should always be used in dip brazing.

The flux usually is prepared for application to the joint surfaces as a water mixture. Three parts of flux powder to one part water is satisfactory for brushing, as shown in fig. 5. Where the flux mixture is to be sprayed onto the parts, a thinner mixture is used. The filler metal usually is dipped into the flux mixture after being formed into the required shape.

In most cases, the assemblies may be placed in the furnace immediately after fluxing. Where large fluxed areas are involved, it may be necessary to remove most of the moisture from the flux, as it may interfere with the process. This may be done by preheating the assemblies for 15 or 20 min at a temperature of about 400°F.

In furnace brazing small assemblies having only small openings, hydrogen gas may be formed when a water mixed flux is used. This gas may

FIG. 4—Prior to brazing, parts must be aligned and held. Tack welding, crimping and fixtures are used for this purpose. These parts are being tacked by spot welding. The racks in the rear carry the assemblies to the brazing furnace.

ignite with sufficient violence to throw the assemblies out of alignment. This difficulty may be avoided by a preliminary drying operation or by mixing the flux with alcohol instead of water.

Proper cleaning of the parts, both before and after the brazing, is essential. Cleaning before brazing removes foreign substances and excess oxide that form on aluminum surfaces. This assists the wetting of the metal surface by the flux, facilitating a good bond at the joints.

In torch brazing, simple cleaning with a solvent or degreaser is sufficient. For furnace or dip brazing, an etching type of cleaner should be used with all alloys except 2S and 3S, for which a solvent or degreaser usually is sufficient. Cleaning by etching may be done by immersing the parts for 20 to 60 sec in a 5 pct solution of sodium hydroxide held at a temperature of 150°F. The parts then are given a water rinse followed by a dip in a 10 pct or stronger nitric acid solution and a second water rinse. The filler material should be cleaned in a similar manner, after being formed into the desired shape.

Because brazing flux is corrosive, the parts must be thoroughly cleaned to remove all traces of flux after brazing. Much of the flux can be removed by immersion in boiling water. This may be followed by a dip in concentrated nitric acid for 5 to 15 min. The acid is removed by a second water rinse, usually in boiling water to facilitate drying. For brazed parts with thin sections, a solution of 10 pct nitric acid and 10 pct sodium dichromate may be substituted for the concentrated nitric acid in the foregoing procedure.

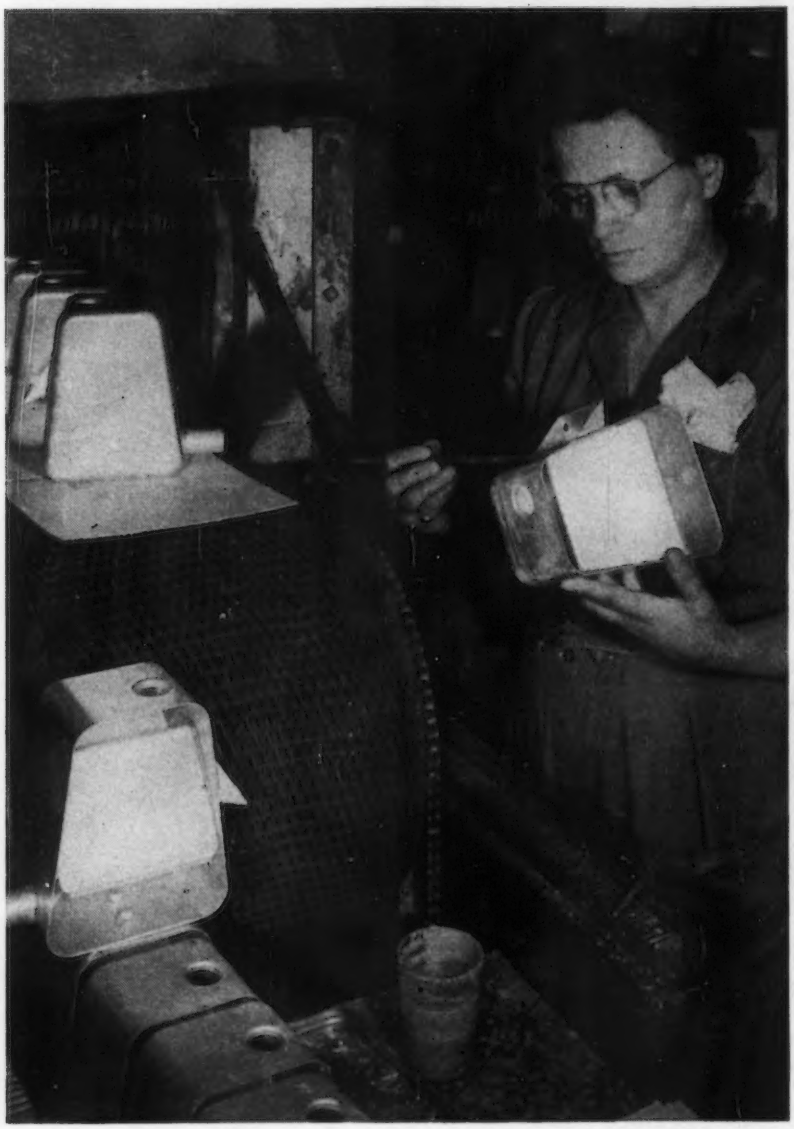


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FIG. 5 — Flux is applied by brushing, dipping or spraying. Here, it is brushed on the area of the part where the brazing metal must flow. The assembly is then placed on a conveyor belt at the tunnel furnace.

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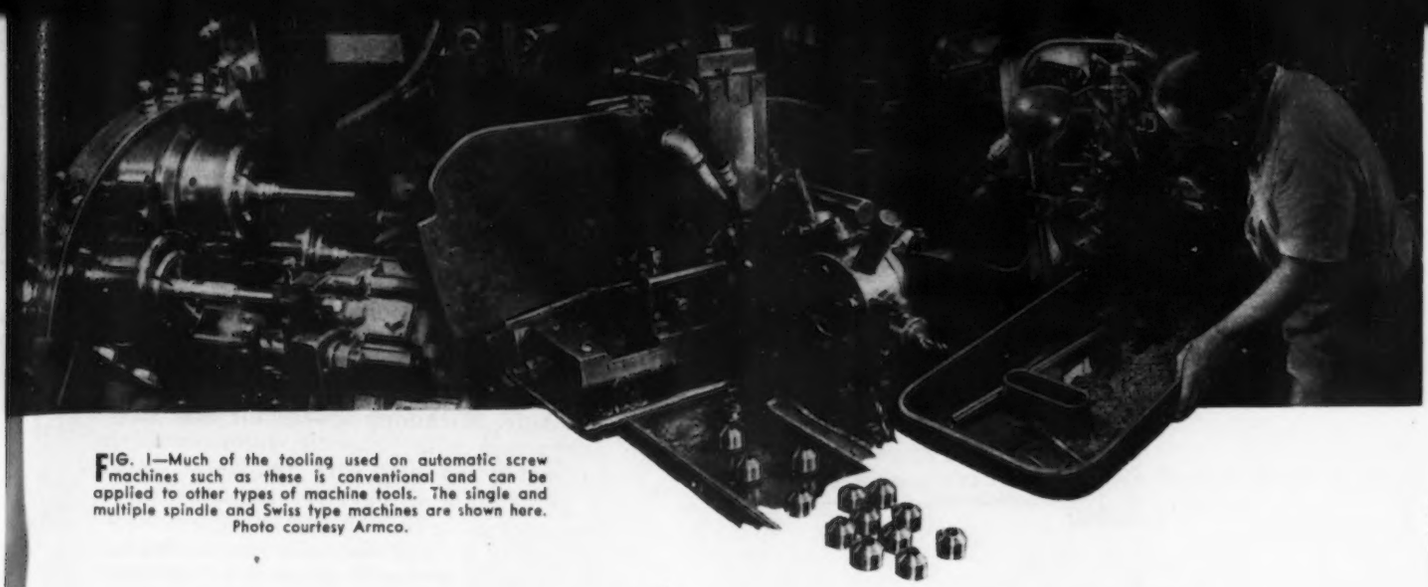


FIG. 1—Much of the tooling used on automatic screw machines such as these is conventional and can be applied to other types of machine tools. The single and multiple spindle and Swiss type machines are shown here. Photo courtesy Armco.

Machining Stainless Steels

While stainless steels can be machined without difficulty using standard machine tools and tool material, variations necessary from practices recommended for machining carbon steels warrant close examination of specific machining jobs. Machining operations on martensitic, ferritic and austenitic stainless grades are analyzed in this article by type of machining operation and machine tool. Also included are a description of the machining characteristics of various stainless steels, automatic screw machine tooling, tool data, and chip breakers and curlers.

o o o

BY LESTER F. SPENCER

Landers, Frary & Clark,
New Britain, Conn.

o o o

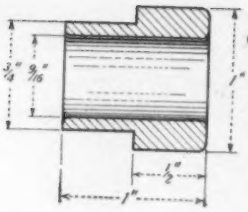
MACHINING stainless steels, using standard equipment, tools and tool material, is not difficult. Individual practices will vary with many factors, such as the specific stainless composition; the structural condition of the material; design of the part, which dictates the operations necessary; type of equipment available; type and composition of tooling; and type and method of lubrication.

The stainless compositions available for commercial use can be divided into three general categories: Martensitic, ferritic and austenitic. Each group is characterized by specific properties that make it invaluable for certain uses.

The martensitic group, of which AISI 410, 416, 420, 431 and the 440 series are typical, has chromium as the major alloying element. These grades are magnetic, will respond to a heat treatment similar to many lower alloy steels, and, by suitable thermal treatment, will develop a wide range of mechanical properties. The maximum corrosion resistance of martensitic stainless steels is not realized until the steel is heat treated.

The ferritic group, typified by AISI 430, 430F and 446, also has chromium as a major alloying element. However, because of the ratio of carbon to chromium, these alloy compositions are non-hardenable, magnetic in character and display maximum corrosion resistance in the annealed condition.

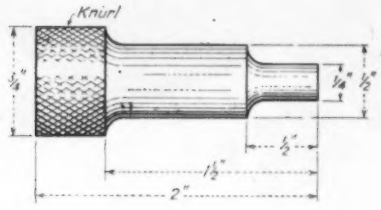
The austenitic alloys contain both chromium and nickel, and both alloying elements are classified as major constituents. Within this group, AISI 302, 303, 304, 309, 316, 321 and 347 are typical compositions. As with the ferritic alloys, the austenitic compositions have their maximum corrosion resistance in the annealed state, and are non-hardenable by the standard heat and quench methods usually employed



MATERIAL—Stainless, type 430F

Operational Steps

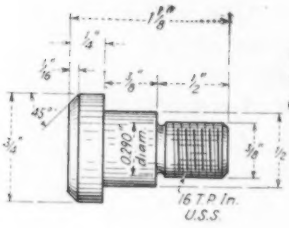
1. Stop	(turret)
2. Spot; chamfer front	(turret)
3. Drill (.01" undersize)	(turret)
4. Ream	(turret)
5. Swing recess tool, chamfer rear	(turret)
6. Form (overlap)	(slide)
7. Cut off	(slide)



MATERIAL—Stainless, type 303

Operational Steps

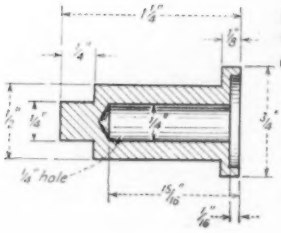
1. Stop	(turret)
2. Rough turn—1/4" D. (bal. turning tool)	(turret)
3. Rough turn—1/2" D. (bal. turning tool)	(turret)
4. Finish turn—1/4" D. (box tool)	(turret)
5. Finish turn—1/2" D. (box tool)	(turret)
6. Knurl (adjustable)	(turret)
7. Chamfer and cut-off	(slide)



MATERIAL—Stainless, type 416

Operational Steps

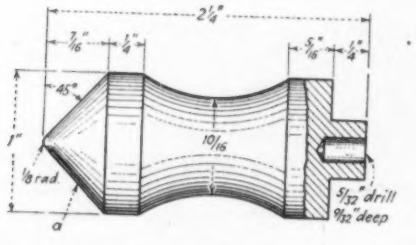
1. Stop	(turret)
2. Form	(slide)
3. Thread	(turret)
4. Chamfer and cut-off	(slide)



MATERIAL — Stainless Steel, type 430F

Operational Steps

1. Stop	(turret)
2. Spot	(turret)
3. Drill	(turret)
4. Finish Drill	(turret)
5. Counterbore	(turret)
6. Form (overlap)	(slide)
7. Cut-off	(slide)



MATERIAL—Stainless, type 303

Operational Steps

1. Stop	(turret)
2. Spot	(turret)
3. Drill	(turret)
4. Form (overlap)	(slide)
5. Form and cut-off	(slide)

FIG. 2—These parts show the various types of machining operations that can be performed on the types of stainless indicated. The operational steps as well as the position from which they were made are included.

with the lower alloy steels. Unlike ferritic alloys, the austenitic group is non-magnetic in the annealed state. A wide range of mechanical properties can be obtained by cold working, and in this condition these alloys may become slightly magnetic because of the formation of ferrite patches around the grain boundaries.

Type 410 is one of the more popular martensitic or straight chromium alloys, and is machined in the hot rolled-annealed, heat treated, or cold drawn condition. The latter is preferred where collets are used to guide the work into the machine. Machining speeds for this alloy, in comparison with bessemer screw stock, is approximately 55 pct, with the chips being quite tough and stringy. As the carbon increases, such as in the 420 and 440 series, abrasive action on the tool increases and machining speeds must be decreased to get a satisfactory finish. Thus, type 420 is machined at speeds of approximately 45 pct of that of bessemer screw stock; whereas the 440 is machined at speeds of 30 to 35 pct of that of screw stock. In both cases, the chips are quite brittle and stringy.

Where maximum machinability is a prerequisite, a free machining analysis is usually employed, type 416 being the machinable counterpart of type 410. This analysis contains sulfur in the form of sulfide stringers, permitting an increase in machining speed of approximately 30 pct over that possible in machining 410. This increased machinability is obtained by sacrificing ductility and impact strength, and this must be recognized in both design and end use.

In higher carbon stainless compositions, a free machining counterpart analysis also can be obtained. However, because of the abrasive action encountered in machining, only a limited increase in machining speed can be realized. Thus, an increase of approximately 10 pct is usually accepted, this figure being over and above that realized in the non-free machining grades.

Of the ferritic compositions, type 430 is quite frequently used where corrosion resistance in the annealed state is desired. Its machining characteristics are similar to those of type 410, and it also has a popular free machining counterpart. Type 430F, the free machining counterpart to type 430, produces chips that are characteristically short and brittle. Machinability of higher alloyed steels, such as type 446, is limited since it has a gummy reaction to cutting operations. No free machining counterpart is available since this analysis for high production machining operations is not available.

Austenitic compositions are inherently tough, which leads to such undesirable conditions such as seizing and galling. Rapid work hardening properties require precautionary measures so the tools do not ride or glaze the work without cutting. For turning, heavy feeds and slow speeds are desired, using chip curlers where possible. All austenitic compositions are similar in their reaction to machining. As the alloy content increases, a reduction in cutting speed is usually mandatory, and frequently forming operations are limited.

The austenitic free machining analysis, type 303, is a counterpart of types 302 and 304, and

is usually supplied in two grades. One has a sulfur addition while the other grade has a selenium addition accompanied by an increase in the phosphorous content. In either case a notable reduction in both ductility and impact strength is realized.

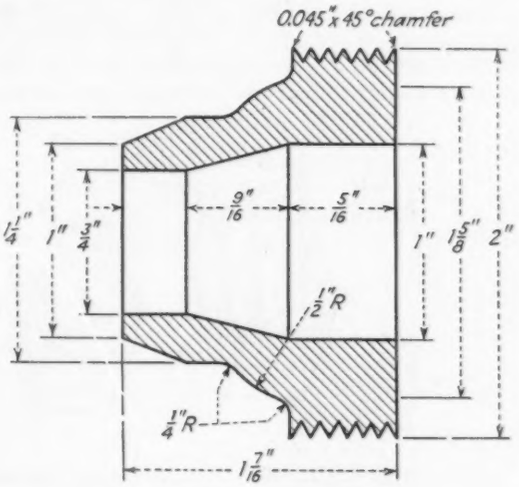
Of interest is the improvement in machinability of chromium-nickel types such as 302 and 304[1] by subjecting the analysis to an anneal at a temperature between 1500° and 1650°F. This causes heavy carbide precipitation in the cleavage planes and grain boundaries. Upon machining, the chips will break off short and free themselves from the work. If such a treatment is employed it is imperative to anneal properly the parts after rough machining (1950°F followed by a water quench) to obtain maximum corrosion resistance. Where this procedure is necessary from a strength standpoint, it may be more economical to employ stabilizing grades such as types 321 or 347, and submit the analysis to this treatment without realizing any loss of corrosion resistance. According to H. B. Knowlton, the titanium treated analysis will give better results, and no full anneal is necessary after machining.

The demand for stainless steel machined components has accelerated the use of the various free machining grades of stainless steels. Thorough investigations within this field have been made by the various steel suppliers, not only from the standpoint of consumer use but from an economical forming and fabricating viewpoint. Palmer[2] determined a sulfur range of 0.12 to 0.30 pct as acceptable for imparting free machining characteristics. However, the addition of either molybdenum or zirconium was necessary to realize similar hot work characteristics of the composition. Thus, the sulfur addition in the form of either molybdenum or zirconium sulfide not only aided machinability but raised the hot short range to 2100°F. DeVries in his work[3] on a free machining casting composition found that additive alloys such as copper and silicon improved machining properties of the low carbon-high chromium compositions, as in type 430. These additions were found also applicable to rolled products and the addition of up to 1 pct of either element had its maximum effectiveness when the material was in the heat treated condition. Other investigators found that the addition of antimony[4] from 0.15 to 2.0 pct improved machinability.

In machining stainless steels, the procedures are fundamental and applicable, with obvious reservations, to all the compositions and various types of equipment. Factual information tempered with experience is the best guide. The automatic screw machine is popular where production demands are high. Within this category are three essential variations, the single spindle; the Swiss type; and the heavy-duty multiple spindle machines.

The single spindle automatic screw machine is characterized by high spindle speeds and relatively light feeds. The Swiss automatic is used where accuracy is essential, and it is adaptable for long slender parts with tapers and shoulders. The Swiss automatic is designed for high speeds and small diameter stock; tolerances are held to 0.0005 in. on shoulders and 0.0003 in. on diameters. The multiple spindle machine is rugged, and able to take cuts at medium to heavy feeds. These types of equipment are shown in fig. 1.

Special purpose machines are as widely used as automatics. The choice of equipment is governed not only by the output demand, but by the design of the part along with the size. The turret lathe is suited to short production runs on stainless.



CROSS SLIDE	TURRET
1. Rough Form small diam.	1. Spot Drill
2. ———	2. Drill for 1" reamer diam.
3. Finish Form	3. Drill for ¾" reamer diam.
4. Face end and chamfer for thread	4. Rough Counterbore
5. ———	5. Finish Counterbore
6. Cut off	6. Thread

FIG. 3—In machining this 303 stainless part, a New Britain-Gridley six-spindle automatic screw machine was used. Shown are the various machining operations and their sequences.

Typical machined parts using both the single and multiple spindle automatics are shown in figs. 2 and 3. These parts are machined to form; the rapidity of operation, surface finish, and accuracy being dependent upon the proper tooling, lubrication, condition of stock, and the method employed in setting up for a specific operation. The first factor to be considered is tooling.

In turning, the type of tool used depends on both the design of the part and the amount of the material to be removed. Where material removal is considerable a roughing tool removes the bulk of the material and is followed by a

[1] *"Machining of Metals," published by American Society for Metals, Cleveland, 1938.*
[2] *"A New Development in Corrosion Resisting Steels," by F. R. Palmer. Transactions of American Society of Steel Treating, vol. 14, p. 877, 1928.*
[3] *"Effect of Silicon and Copper on Stainless Steels," by R. P. DeVries, American Society for Metals, "Book of Stainless Steels," p. 399.*
[4] *"Effect of Antimony in 18-8 and Plain Chromium Stainless Steels,"* THE IRON AGE, *May 16, 1946, vol. 157.*

finishing cut. With the single spindle machine, the roughing operation is usually done with the balanced turning tool, plain hollow mills, or the adjustable hollow mills. The balanced turning tool is preferred for roughing since it is rugged, adjustable over a wide range of size, and the simple square blades are easy to grind and set. This tool cannot be used, however, when one or both cross slides are brought into action immediately after rough turning because the tool body is so large it requires more time to clear. Also, where long slender pieces of small diameter must be turned to size, as in small motor shafts, the plain or adjustable hollow mill will produce more satisfactory results.

The plain hollow mill is primarily a roughing tool and is designated for single stock size. The three teeth, each taking a balanced cut, reduce the stock to the desired rough diameter and permit it to pass through the hole in the mill that supports long slender pieces. As there is only a slight clearance between the diameter

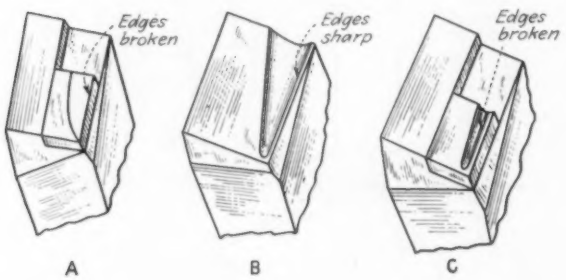


FIG. 4—Chip breaker and chip curler designs. The chip breaker grind *A* is used for a carbide box tool but may also be used in other types of tools. Chip curler groove *B* is usually applied to high speed steel compositions. The chip curler for carbides shown as *C* should be modified by breaking the cutting edge with an end hone.

of the turned stock and the hole in the mill, a periodic check is imperative to determine that the mill is cutting to proper size. As to the reason for the choice of the three tooth hollow mill, experience has indicated that in the majority of cases this design produces less chatter.

It is necessary that cutter teeth be sharp at all times because dull teeth may cut oversize. This will cause greater bar diameter than the clearance resulting in binding and the mill loading up. Plain hollow mills should be held in floating holders and an abundance of cutting fluid is usually required. The adjustable hollow mill differs from the plain hollow mill in the arrangement of the cutting edges, which, in this type, are in the form of inserted blades with independent radial adjustment. In the use of this type of milling cutter, the larger body of the tool as compared to the plain hollow mill must be considered when planning operations.

Box tools are used to a considerable extent in the single spindle automatic for finishing cuts. They offer several advantages. They are adjustable over a wide range of diameters; two or three tools can be mounted in the holder for turning different diameters, facing shoulders or pointing the work; and they offer support in turning long slender parts. The box tool is used frequently as a roughing tool on multiple spindle machine. The feeds will vary on an average job from 0.003 to 0.0075 in. per revolution, depending upon the size of the material, depth of cut, and capacity of the machine. On stainless steel stock of 1½ in. diam, feeds may go to 0.012 in. or higher.

The knee tool, which has a right angle body arranged to hold a radial cutting blade in addition to its provision for holding either a drill or centering tool, is utilized for roughing work on heavy sections on the multiple spindle machine. Such tools require less clearance space than either balanced turning or box tools. In operation, the blade of the knee tool is set to produce a radial cut with the cutting edge perpendicular to the centerline of the bar stock. Back rests are not available with this tool, and consequently it is used for operations close to the chuck and on stock diameters large enough to prevent deflection. Although a combination of operations such as turning and drilling or turning and centering can be done with the knee tool, this practice is not usually recommended[5] where enough turret positions are available to provide for separate operations. The combination of these two operations results in either an eccentric center hole or a step on the turned diameter.

The use of chip curlers or breakers on either a box tool or similar turning tool is recommended. Rustless[6] suggests the use of a chip breaker grind as illustrated in fig. 4A for medium or light cuts with carbide tools. For heavier cuts, particularly in machining austenitic compositions, chip curler grinds as shown in figs. 4B and 4C are recommended. In grinding the chip curler, the groove should not break through the front edge of the tool otherwise a marred torn surface may result. Alesch and Stevens[7] give the cutting tool working angles and the chip control details of a turning tool shown in fig. 5. This basic shape of the cutting tool is derived after several preliminary experiments in their study on the factors affecting the machinability of the stainless steels.

It has been the experience on single spindle automatics that better surface finish is realized without the use of chip breakers. However, where exceptionally heavy cuts must be made on the austenitic alloys, which occurs more frequently when using multiple spindle machines, the chip curler has proved its value. For single and multiple spindle machines the use of the chip curler is rather infrequent.

Of greater importance is that the tools be properly ground and sharp and that the available equipment have sufficient power to assure continuous cutting. Dull tools, especially with the austenitic stainless compositions, will glaze the work and abnormally work harden the surface, thereby increasing the difficulty of cutting. Also, to minimize cold working tendencies of the austenitic stainless compositions, the maxim is *heavy cuts at slow speeds.* In regard to the recommended conditions for turning, Von Hamback[8, 9] states:

"Select as large a tool as possible because the life of the cutting edge depends upon good heat dissipation in the body of the tool as well as

into the work and the cutting oil. To insure maximum mechanical support to the cutting edge. It is best to hold front clearance angles to a minimum of 7° to 10°. The top take angle should be fairly steep. Tools with a 5° to 10° angle will generate less heat and will be freer cutting. Generous chip curlers or chip breakers are also a decided advantage. Use finishing cuts for close tolerance work. All stainless steel will take a good finish and, on light cuts, a good coolant that will carry away the heat is more important than a lubricant."

[5] *"Pitfalls in Tooling Screw Machines," N. Brindle,* Screw Machine Engineering, *April to December 1948.*
[6] *"Machining of Stainless Steels," published by Rustless Iron & Steel Div., Armco Steel Corp., Baltimore.*
[7] *"Machining Stainless Steels," by C. L. Alesch and G. J. Stevens,* THE IRON AGE, *Jan. 25, 1940, vol. 145.*
[8] *"Machining the Stainless Steels," by E. Von Hambach,* Steel. *Sept. 30, Oct. 7, Oct. 14, 1946.*
[9] *"Notebook on Machining Stainless Steels," published by Carpenter Steel Co., Reading, Pa.*
[10] *"U.S.S. Stainless and Heat Resisting Steels," published by Carnegie-Illinois Steel Corp., Pittsburgh.*

The selection of cutting speeds and feeds for each operation in a sequence is dependent upon several factors, among which include the composition of the material being formed; the type of cutting tools employed; the condition of the equipment employed; and the type of operation. As a basis of determining the cutting speeds and feeds, one must necessarily rely upon experience, but aid in the selection of these factors can be had from values as given by the various steel suppliers. Such data are of necessity tempered to meet the requirements of individual problems, type of tool material, type and method of lubrication, accuracy desired, and operational step breakdown. Such cutting speeds and feeds are only a guide, the figures representing the averages for the general run of parts made from cold drawn stainless steel. The selection of spindle speed of the single spindle automatic must be calculated, based on the allowable cutting speed in surface feet per minute for each individual operation. Care must be taken to check the cutting speed allowable on the operation requiring the slowest speed. Many times the speed selected is too fast for such operations as threading and the only recourse in such cases is to sacrifice on the other operations by taking a speed suitable for threading.

Circular forming tools and circular cutoff tools are used exclusively on the cross slides in the single spindle automatic. Both of these tools are considered as within one type as they are similar in design and application. The cutoff tools are rather thin and part the finished piece from the bar, whereas the forming tool is used in shaping or turning part or all of the body of the item. There is a limit in length beyond which it is not practical to form pieces with a circular forming tool, as the pressure of the wide forming tool becomes too great and the piece is likely to spring or be twisted off. The length should not exceed 2½ times the smallest diameter. The circular forming tool is easy to set up and maintain, simple to produce, and is efficient in cutting time.

On deep forming operations, side clearances from 1° to 2° [10] and 3° to 5° [6] have been recommended, but this depends on both the shape of the form tool and the depth of the cut. It is imperative to design tools with a side clearance since not only will there be a reduced tendency to seize and gall, but the life of the tool will be materially increased. Excess metal that remains due to clearance angles introduced in the form tool can be removed, if necessary, by subsequent shaving. Recommended top rake angles on form tools should be between 7° and 10°.

To show the versatility of operations performed on the cross slide, several examples are shown. In fig. 6*A*, both cross slide tools do the forming and the piece is fed out before cutting off. This method can be used where there is a shoulder that can join the portion formed by the two tools. It is not practical to blend cuts of two tools on a plain surface as it is hard to

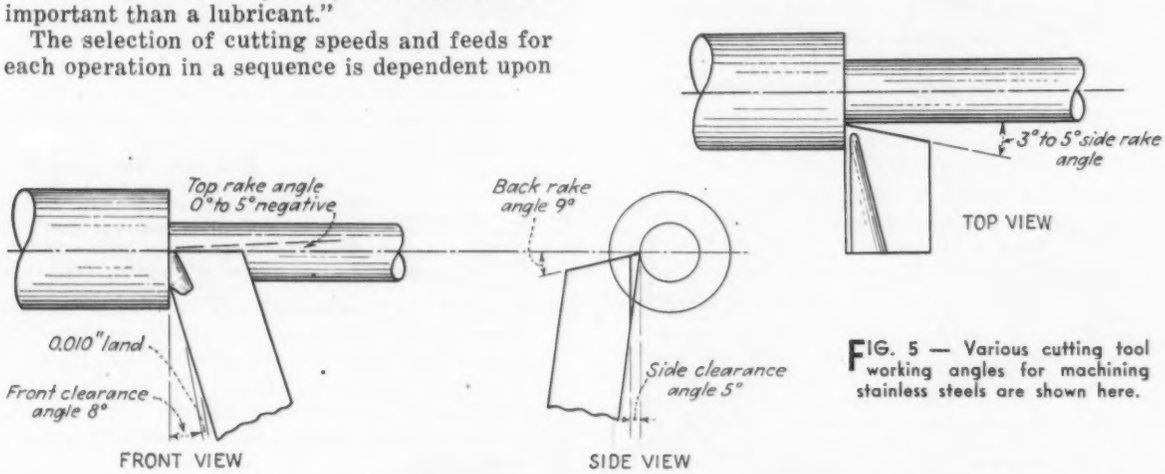
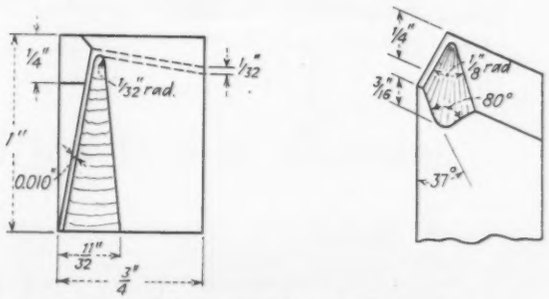


FIG. 5 — Various cutting tool working angles for machining stainless steels are shown here.



CHIP CONTROL GROOVE DETAILS

set the tools, and a line or ridge is usually left where the cuts join. The tool on the back cross slide must not start to cut simultaneous with the one on the front slide or the diameter near the chuck will be reduced so that the piece will not stand the forming at its outer end.

In fig. 6*B*, the forming tool on the front slide rounds the corner at the top of the screw after threading, and the cutoff tool forms the end of the next piece while cutting off the one that is completed. In fig. 6*C*, forming and cutoff are done with the front cross slide tool as the rear cross slide carries a drilling attachment for putting the hole through the piece.

Fig. 6*D* shows how one end of the piece is finished with the cutoff tool, while the other end is produced by the form tool on the front cross slide after the bar has been fed out. This is not good practice where the ends must be concentric, because variation in the stock when fed forward and gripped in a different place may cause the inner end of the piece to be out of center with the outer end. The method of supporting the outer end of a long slender piece is illustrated in fig. 6*E*. The back rest is held in the turret supporting the work on the turned diameter behind the threaded portion. Fig. 6*F* shows a forming tool on the front cross slide producing part of the round head and squaring up under the head. The balance of the form is carried on the cutoff tool, which must be designed and set to blend with the curve produced by the forming tool except in the case of compound curves on the head where one radius is usually on the forming tool and the other on the cutoff tool.

It is customary in making round-headed screws, bolts, rivets and similar pieces to design the forming tool so that it will cut around the head to about the diameter of the body of the piece, leaving the balance of the head to be formed by the cutoff tool. When designing the cutoff tool for such a job the fact that the piece breaks off before the point of the tool reaches the center must be taken into consideration and the radius of the tool set slightly ahead. Otherwise, the curve will not blend with that of the forming tool.

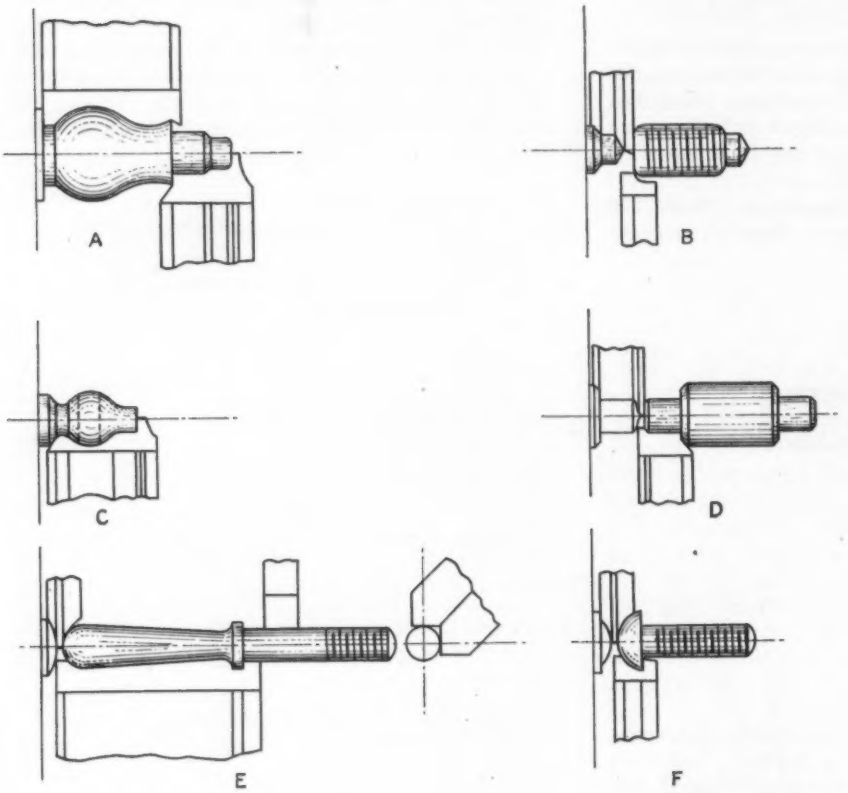


FIG. 6 — These parts, the machining of which is explained in detail in the text, illustrate various types and uses of forming tools.

Form tools have side clearance angles from 1° to 4°, the specific angle being dependent upon the depth of the form, the design of the item, the effect of the tool on shoulders, and the material to be formed. Side clearance angles will eliminate galling and seizing and increase tool life. Top rake angles suggested are from 7° to 10°[6]. Good practice dictates the use of slightly chamfered corners on roughing form tools in that it will usually permit higher cutting rates and considerably reduce tool failure.

For multiple spindle automatics, the dovetail tool is preferred over the circular form tool and is employed in practically every instance of deep forming. This is because the dovetail is more rugged than the circular form tool, permitting deeper cuts at relatively higher speeds.

The forming operation is usually done last for several reasons. The piece is often weakened by forming; rounded shoulders or burrs

left on previous turning operations can be removed; and forming can be done in many instances as the piece is being cut off, thereby saving time. In this respect, where slow forming operations are made, the cutoff tool may be held back so that the piece is not weakened too much before forming is completed. .

Drilling with automatic screw machines is different than hand drilling where faulty drilling technique can be ascertained immediately. It is imperative to have sharp drills at all times. A substantial quantity of a good lubricant should be used during drilling to keep the work and the tool cool and wash the chips from the hole.

Drills used in the machining of stainless steels should be provided with a heavy web and a short spiral, with the point included angle of 118° and a helix angle of 28° to 32°. For shallow holes or where excessive drill breakage from torque is experienced, the point included angle may be changed to 130°. The 118° angle is recommended in drilling austenitic stainless compositions. High speed drills chucked for the shortest drilling length are preferred, the standard drill lengths being usually too long Where short chucking cannot be done, Von Hamback[8] suggests a crankshaft hole drill, which can be successfully used because of its short spiral.

In drilling deep holes, more than one drilling operation within the sequence of operations is recommended. The breakdown of the number of drilling operations to follow in succession is determined by the other operations and available tool positions. On the single spindle automatic, the drilled hole for the first insertion should be calculated on the basis of 3 to 4 times the diameter of the drill. On the second insertion, the depth extension should be between one and two diameters of the drill. On both the third and fourth insertions, approximately ¾ of the diameter of the drill is used as the guiding factor.

In calculating speeds and feeds, the diameter of the drill and the diameter of the work must be considered. Speeds and feeds recommended by steel suppliers are based on the premise that drill size is approximately 50 pct of the stock width or diameter. When the drill diameter approaches or exceeds 75 pct of the stock width or diameter, reductions of spindle speeds or the use of drilling attachments to lower the drill speed will be necessary to prevent rapid drill wear. Conversely, when the drill is less than approximately 25 pct of the stock diameter, drill speed can be increased.

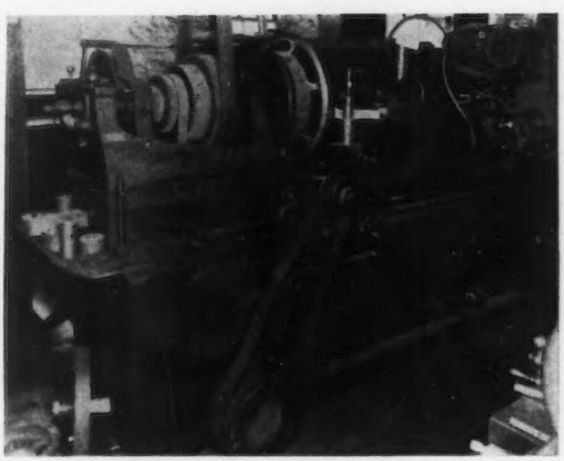
In drilling stainless, especially the austenitic grades, a liberal application of coolant should be employed not only to cool and lubricate the drill but to wash away chips. It is good practice to back out the drill at intervals to relieve chip congestion. In the event of hand fed drilling operations, it is necessary to apply positive pressure in drilling austenitic steels to minimize work hardening. When backing out to relieve chip congestion, the drill should be carefully inserted near the bottom of the hole before starting with a positive feed. A steady pressure will prevent the drill from riding and glazing the work.

In the second part of this two part article to be published next week, the author describes proved practices for tapping and threading, reaming, skiving, shaving and other machining operations, and includes machine setups whereby certain of these operations are used. Coolants and lubricants required are also described.

Converting Machines to the Use of Carbides

JUST how old does a machine tool have to be so that carbide tools can't be used on it? Converting old machines to the use of carbides is not hard and the relatively low cost of the changeover is often justified by lower manufacturing costs and increased production per machine-hr. A 31-year-old planer type miller was recently reconditioned and equipped with a larger motor. Retooled with carbides, it is now used for milling cast iron air-cooler water boxes and covers, removing 150 cu in. of metal from each part. Conversion cut the annual operating cost of the machine by 50 pct, increased metal removal per grind from 600 to 4500 cu in., extended cutter life between grinds from 8 to 30 hr, and raised the cutting speed from 110 to 300 sfpm.

An extreme example of the use of carbide tools on old machines is on the lathe shown in the accompanying illustration. It is so old that the user, Whitin Machine Works, has no record of its age or builder. Yet, it is being used to turn out wheel handles for Whitin machines, generating a radius with a Carboloy grade 44A tool.



THIS lathe with a wooden bed is so old that the user has no record of its age or builder. It is being used to turn out wheel handles, generating a radius with carbide tools.

Fracture of Ductile Metals

Examination of available data relating to factors that affect the fracturing of ductile metals reveals that even the fundamental phenomena are not well understood and that much of the data are inconsistent with the concept of a fracture stress law. Discussing the influence of factors, such as temperature, strain and combined stresses, on fracturing, the author calls attention to the need for more comprehensive data on the rate of growth of microcracks in ductile metals.

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BY JOHN E. DORN
Professor of Metallurgy, University of California, Berkeley, Calif.

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ALTHOUGH a fairly complete theory exists for fracture of brittle amorphous materials such as glass, several recent surveys[1-4] reveal that the fundamental phenomena for fracturing of ductile crystalline materials are not yet well understood. Nevertheless, substantial progress in uncovering the numerous factors of significance in the fracture of metals is now being made in many laboratories. It is the purpose of this article to discuss the effect of various factors on the fracture strength of metals and to indicate some possible methods of attack on this problem.

Single metal crystals are known to fracture by two alternate mechanisms, cleavage and shear[5, 6]. Cleavage fractures are obtained when the stress normal to a cleavage plane reaches a critical value which is practically independent of the extent of the deformation preceding fracture. Shearing fractures occur on slip planes, usually after extensive deformation, when the resolved shear stress on the slip plane apparently achieves some critical value. Whereas cleavage fractures are characterized by bright mirror-like surfaces, shear fractures are generally rough and irregular.

The appearance of shear fractures suggest that the metal may have been "damaged" by previous plastic flow along parallel slip planes in a slip band in such a way as to cause the fracture to proceed from one shear plane to other parallel shear planes in the deformation band. Although cleavage fractures can occur without evidence of plastic flow, it appears that the shear fractures are initiated as a result of slip after plastic deformation has damaged the metal by microcracking.

In the close-packed hexagonal metals the shear and cleavage planes are identical and distinc-

tions between the two modes of fracture are only resolvable in terms of the stress laws which are followed and the microscopic appearance of the fractured surfaces. In contrast, however, body-centered cubic metals, such as iron, shear on 110, 112 and 123 crystallographic planes, whereas they cleave on the 100 planes. Parker, et al[7], have shown that notched bars of polycrystalline mild steels fracture brittlely on 100 cleavage planes when the temperature is below a transition temperature, whereas the silky fracture, obtained at higher temperatures and associated with higher impact values, occurs on other planes, presumably the shear planes.

Temperature appears to have different effects on the cleavage and shear fracture stresses for single crystals[5, 6, 8] as shown in fig. 1. In spite of rather extensive scatter of data, the normal stress for cleavage fracture seems to increase very little as the temperature decreases; with decrease in temperature, however, the shear stress for a shear fracture parallels more or less the general increase in the shear stress for initiating plastic flow. Such evidence again suggests that the fundamental processes leading to cleavage are not sensitive to plastic behavior, while shear fractures on slip planes are probably caused by structural imperfections that are introduced during plastic flow.

The effect of temperature on the fracture strength of polycrystalline metals has been obtained almost exclusively from tensile test data. In general, the tensile ductility of the face-centered cubic metals, such as aluminum alloys, copper alloys, and austenitic steels (which are prone to exhibit shear modes of fracturing) is almost independent of temperature. On the other hand, close-packed hexagonal and body-centered cubic materials (which exhibit both cleavage and shear fractures) generally have a transition temperature. Above the transition temperature ductile fractures are obtained and the strains to rupture are high, whereas below the transition temperature, cleavage fractures occur and the ductility is low.

The trends in these observations are in qualitative agreement with the thesis that the fracture stress for cleavage does not increase as rapidly with decreasing temperatures as the increase in the flow stress; but the shear fracture stress appears to be affected by temperature in a manner quite similar to the effect of temperature on the flow stress as shown qualitatively in fig. 1.

The qualitative picture for flow and fracture given in this figure has inherent defects. According to the diagram there should be a gradual lowering of the ductility in the region of the transition temperature. Actual observations, however, reveal that a precipitous drop in energy to fracture frequently takes place for many materials as the temperature is lowered through the transition range. The second objection to fig. 1 is more fundamental; when fracture data are recorded as shown, the tacit assumption is made that a shear fracture stress actually exists. The preponderance of evidence cited thus far, however, suggests that shear fracturing results

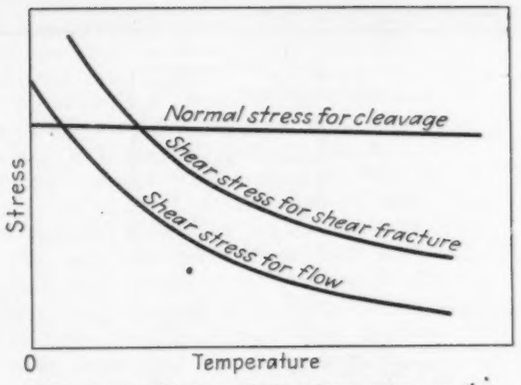

FIG. 1—Qualitative effect of temperature on the shear stress for initiating slip, shear stress for shear fracture and the normal stress for cleavage.

from crystal damage, such as microcracking, that is induced by plastic flow[9].

Zener[10] postulated that coalescence of dislocations might be responsible for microcracking which leads to eventual separation of the metal. Whatever the mechanism of ductile fracturing,

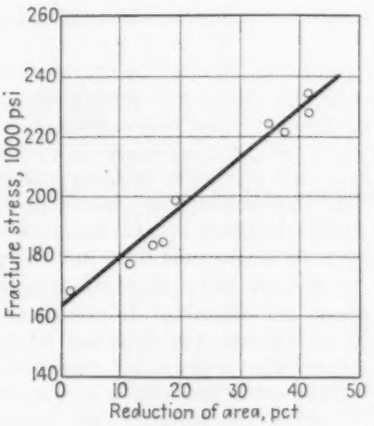

FIG. 2—Effect of tensile strain on the fracture stress of a pearlitic steel at —310°F (after Hollomon).

it is not only conceivable but highly probable that ductile fracturing is primarily dependent on plastic flow. Thus the fracture stress might be an illusion; the stress obtained at fracture might be the flow stress at that instant of the deformation when damage becomes so severe that a small incremental deformation causes rupture.

The effect of strain on fracturing is well-known only for pearlitic steels[2, 11, 12]. Whereas

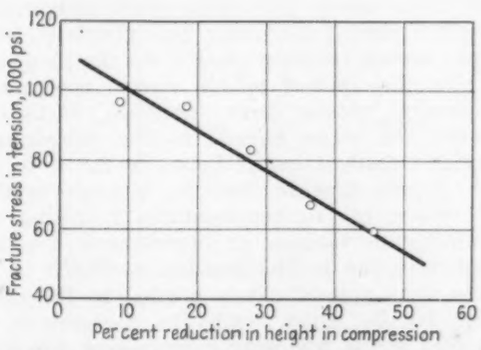

FIG. 3—Effect of compressive strain on the fracture stress of a pearlitic steel (after Korber, Eichinger and Moller).

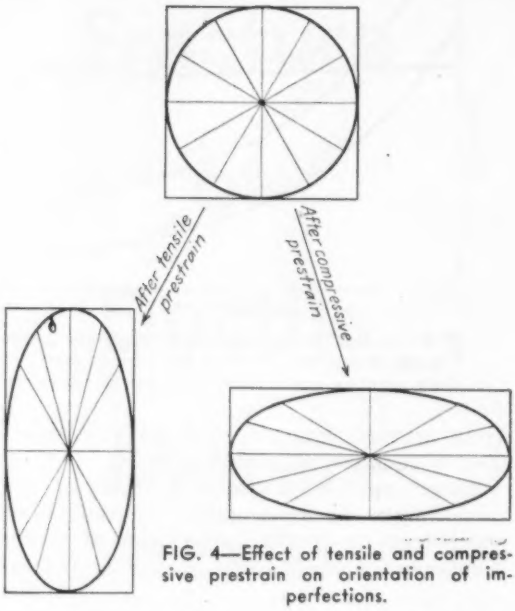

FIG. 4—Effect of tensile and compressive prestrain on orientation of imperfections.

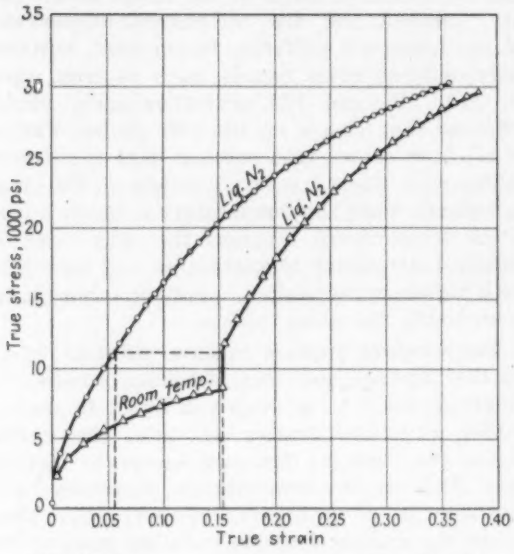

FIG. 5—Failure of mechanical equation of state.

pearlitic steels are ductile at atmospheric temperatures, they are sufficiently limited in ductility at appropriately lower temperatures to fracture without necking; therefore, the ambiguities concerning the stress distribution in necked regions of a tension bar can be avoided by testing the metal at low temperatures.

Fracture data from tension tests at —310°F, after prestraining in tension at atmospheric temperatures, are recorded in fig. 2. These data apparently prove that the fracture stress increases with increasing prestrain in tension.

Korber, Eichinger and Moller[13] investigated the effect of compressive prestrain at atmospheric temperatures on the fracture stress in tension at subatmospheric temperatures of pearlitic steels. A typical example of their data, shown in fig. 3, suggests that prestraining in compression lowers the subsequent fracture stress in tension. The apparent contradiction between the fracture data for tensile and compressive prestrains was at one time attributed to the differences in the reorientation of microcracks[2] obtained by these two alternate processes of prestraining.

Whereas tensile prestrains rotate microcracks, pearlitic plates, and other imperfections which might induce fracture away from the plane normal to the applied tensile stress, compressive prestrains rotate such fracture instigators toward the plane normal to the subsequently applied tensile stress as shown in fig. 4. In this way, it was thought that the increase in fracture stress at low temperatures following prestraining in tension at atmospheric temperatures was due to the smaller incidence of imperfections approximately normal to the subsequent tensile stress, while the decrease in the fracture stress following compressive prestraining was attributable to the greater number of imperfections more favorably aligned for promoting fracture.

An alternate explanation[14] for these data, which is consistent with the present thesis that fracture is due to damage attending flow, is possible. Careful observations made by the investigators showed that fracture at the lower temperatures was always preceded by a small amount of plastic flow. Prestraining at room temperature is known to increase the flow stress at lower temperatures by work hardening the metal. The "apparent fracture stress" measured after prestraining, therefore, was probably that necessary to induce enough plastic flow to cause sufficient microcracking to induce fracturing. In other words, the recorded stress is merely the flow stress at the strain which introduced critical microcracking leading to fracturing.

This hypothesis for the effect of tensile prestrain on fracture strength, however, demands either that crystal damage toward fracture be greater for plastic strains of about 1 pct at the lower temperatures than the damage induced at the higher temperature for much larger strains, or that a different mechanism for fracture is provoked at the lower temperature. Although the mode of fracture was not reported for these investigations, the previously quoted studies on fracture by Parker[7] suggest at least the possibility of a change in the mode of fracture. Studies on the effect of thermal mechanical history[15] on the plastic properties of metals, described in the following text, suggest that a greater amount of crystal damage is induced when the straining is conducted at lower temperatures.

The upper true stress v. true strain (logarithmic strain) curve of fig. 5 was obtained from tensile test data on pure aluminum (99.98 pct) at liquid nitrogen (—319°F) temperature. The data presented in the lower curve were obtained by prestraining to $\epsilon = 0.153$ at atmospheric temperature and then continuing the test at liquid

nitrogen temperature. As shown in the figure, a strain of only 0.058 at liquid nitrogen temperature yields the same flow stress at this temperature as a prestrain of 0.153 at atmospheric temperatures. Thus the rate of strain hardening is greater at lower temperatures. Since strain hardening arises from structural changes attending deformation, it follows that greater structural changes for resistance to flow are induced by deformations at the lower temperatures.

It is quite probable, therefore, that the rate of crystal damage leading to fracture might also be increased by straining at the lower temperatures. The resolution of the question of the effect of thermal-mechanical history on fracturing of metals will undoubtedly require extensive research. If, however, fracture is attributable to crystal damage due to straining, the compression data of Korber, et al, are understandable. Increasing prestraining in compression introduces a corresponding Bauschinger effect upon reversal of the stress which causes plastic flow at lower tensile stresses. Thus some logic might result if existing data on fracture are appropriately marshalled for examining the merits and defects of the crystal damage hypothesis.

An important observation was made by Hollomon and Zener[9] which is completely inconsistent with the stress criterion for fracture and therefore serves as critical data for checking any fracture hypothesis. When a pearlitic steel was tested at —310°F, it gave the stress strain diagram shown in fig. 6. fracturing at the lower yield strength after a small deformation. This evidence demands that, if a fracture stress exists, it be above the upper yield stress initially and then decreased with increasing plastic tensile strain until it reaches a value of the lower yield stress.

When this evidence is incorporated with the previously quoted evidence on the effect of prestraining on fracture, the inconsistent trends shown in fig. 7 are obtained. Curve *ab* is a schematic representation of Korber's data on the effect of compressive prestrains on the subsequent tensile fracture stress, whereas *cd* represents Davidenkov's[12] data for the effect of tensile prestrain. If there is a fracture stress and if it depends on prestrain, it is only logical to assume that *ab* and *cd* are branches of a continuous curve *abcd*.

But the data given in fig. 6 demand that the fracture stress be higher at zero tensile prestrain and that it decrease to the lower yield strength somewhat similarly to that depicted by curve *ec* of fig. 7. Either some of these data are in error or they have been misinterpreted.

The data are only inconsistent when the fracture stress criterion is invoked. When this criterion is abandoned in favor of the crystal damage hypothesis for fracturing, the data are no longer contradictory. According to the crystal damage hypothesis, shear fracturing could not have occurred at the upper yield because plastic straining must take place before the microcracks can grow to such a size as to induce rupture. Apparently at the test temperature that was employed (fig. 6), the damaging strain was approximately equal to the yield strain. Thus order is established by the strain damage principle out of the confusion introduced by the previously accepted fracture stress criterion.

In connection with the above observations, it is interesting to recall again the type of tensile experiment that has been done so often. Under carefully controlled testing conditions it is a simple matter to interrupt the tensile test of a ductile metal at some stage during necking. Macrosections or radiographs of the necked section frequently reveal that a crack is present, as shown in fig. 8, although the bar has not yet separated. In order to induce this crack to grow, the metal must be strained. Obviously, the crack originated at a lower true flow stress than that which applies when the bar separates. In fact, no one stress can be isolated as the fracture stress. Most likely, crack growth occurred at all stresses which induced plastic flow and opening of the crack. In view of this evidence it is indeed surprising to be misled in the direction of postulating a fracture stress.

Effect of Combined Stresses

The effect of combined stresses on the fracturing of metals[16] has been investigated prin-

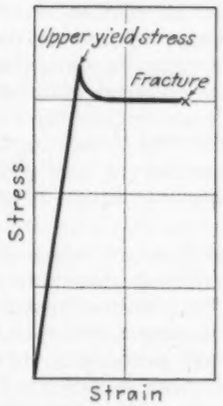

FIG. 6—Fracture of pearlitic steel at —310°F (after Hollomon and Zener).

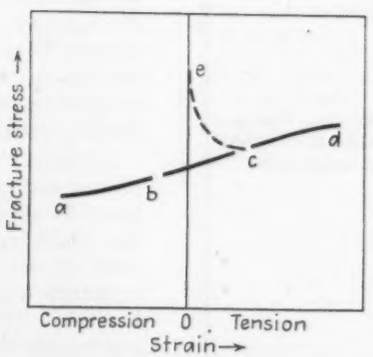

FIG. 7—Inconsistencies of the fracture stress criterion.

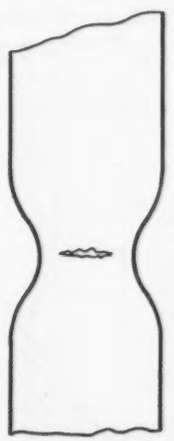

FIG. 8—Section of a necked tension bar revealing a central crack.

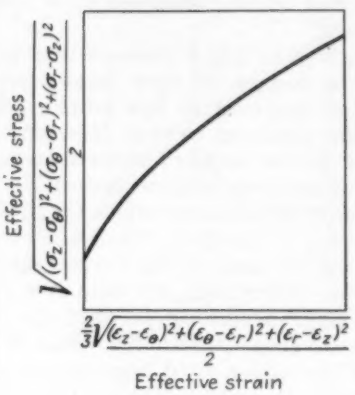

FIG. 9 — Work hardening curve for plastic deformation under simple states of combined stresses.

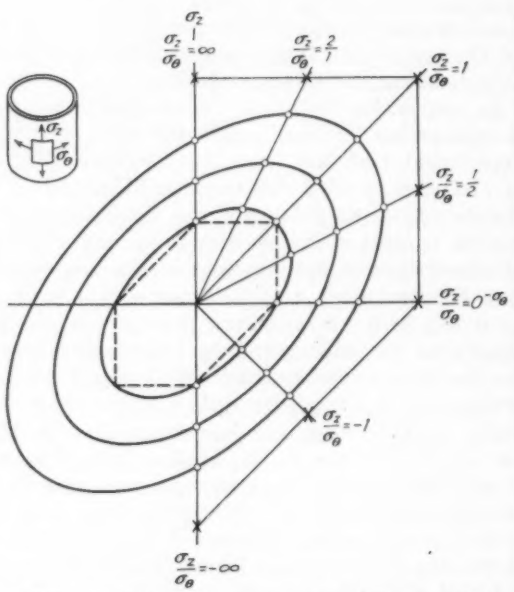

FIG. 10—Schematic diagram for plotting plastic flow and fracture data. O = stresses at constant value of effective strain. X = fracture stress.

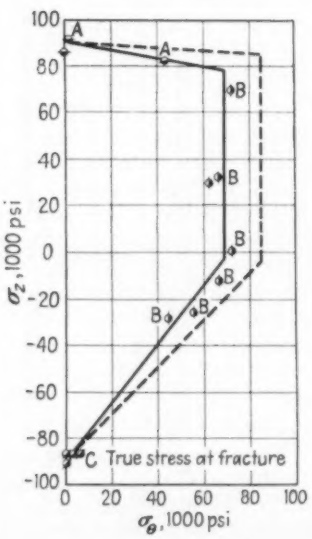

FIG. 11 — Fracture stress for 24ST-81 aluminum alloy.

cipally by means of thin walled tube tests. Circumferential tensile stresses, σ_θ, and axial tension or compression, σ_z, were obtained by applying internal pressure and simultaneous axial tension or compression loads. For the tests described here the loading conditions were conducted so that the ratio of the stresses remained substantially constant throughout any one test. Plastic behavior under various combined stresses for these tests can be correlated by plotting an effective stress as a function of an effective strain[17, 18] as shown in fig. 9*. For simple tension (or compression) the Effective Stress v. Effective Strain Curve is merely the true stress v. true strain tension curve. According to this theory, which is in fair agreement with the facts, when combined stress data are plotted as shown in fig. 6, a single work hardening curve should be obtained for all stress ratios.

Combined stress data for plastic flow in tube tests are also reported as shown in fig. 10. The tube is stressed at one ratio of stresses until some value of effective strain is reached, whereupon this datum is recorded by a point. Additional points on the same stress ratio curve represent correspondingly higher values of the effective strain. When the points for various stress ratios at a constant effective strain are joined, a von-Mises ellipse, identical with that for plastic yielding is obtained. The successive series of concentric ellipses represent successively higher values of plastic strain energy. Fracture stresses, if they exist, can be plotted on the same diagram. Actually, most experimental data for a given plastic strain energy lie somewhere between the ellipse and an enclosed maximum shear stress hexagon as shown within the first ellipse. To a first approximation, therefore, the maximum shear stress criterion is useful for correlating states of stress at equal plastic strain energies.

A typical example of the fracture stress diagrams for precipitation hardened aluminum alloys[16] is shown in fig. 11. To a first approximation these data indicate that precipitation-hardened aluminum alloys rupture principally in accordance with a maximum shear stress law for fracture. The major deviation from the shear stress law arises when the plane of maximum shear stress is parallel to the mechanical fibering. It is a well known observation that anisotropy of fracture usually occurs in wrought materials

*The effective stress—effective strain theory is an extension of the octahedral shear stress—octahedral shear strain theory first postulated by Nadai. It is now known to be a good first approximation to the facts. It does not, however, account for the following observations: (1) Difference in tensile and compressive stress-strain curves; (2) systematic failure of Lode's relations; and (3) extension of a torsion bar when twisted, and continued extension when the bar is untwisted.

Reiner and Prager have independently derived the most general relationships for stress and plastic strain which admit the three facts quoted above. These relations are so general, however, as to be untractable. It is possible to formulate a tractable extension of the effective stress v. effective strain theory for plastic flow of isotropic metals by including not only first power but also quadratic terms of the stresses in the stress-strain equations. This formulation will be presented soon. The effective stress-effective strain formulation is satisfactorily close to the facts, however, for the present arguments.

under conditions of orientation of stress with fibering due to segregation and fibering of brittle microconstituents and impurities.

A maximum shear stress criterion for fracture is not at first too disconcerting. But when the theories for fracture stresses are reviewed they appear to suggest that a principally normal stress law should apply. Either the theory is misapplied or the type of fracture exhibited by the aluminum alloys is not dictated by a stress law. If, now, the same data are again reviewed in the light of the strain damage principle, it becomes clear why separation occurs when the shear stress approximately reaches some critical value. At a given value of the shear stress, the plastic strain energy has also achieved a fixed value. Thus the fracture data for the precipitation-hardened aluminum alloys are consistent with the crystal damage principle. The inception of earlier fracture in the first stress quadrant when the circumferential stress is the maximum principal stress is most likely attributable to the propitious orientation of microcracks, inclusions, etc., which enhance the damage attending plastic flow. Consequently, fracture is believed to occur at smaller strains when the fibering is in the plane of maximum shear stress.

Typical data for the fracture of magnesium alloys[16] are shown in fig. 12. Again the data agree reasonably well with a shear stress law for fracture. The observed data, however, are inconsistent with any stress law for fracture that might be formulated. They do conform approximately with the strain damage principal but it is not yet known why higher strain energies are required to cause fracture in tension, compression and equal biaxial tension, where cusps are observed in the fracture stress diagram. Obviously, the extent of strain damage is not a simple function of the plastic strain energy. Additional investigations are needed to uncover the causes for the cusps observed in the fracture stress diagrams for magnesium alloys.

Prompted by comments of several years standing[17] that gray cast iron probably exhibits two laws for fracture, a normal stress law and a shear stress law, Grassi and Cornet[19] recently determined the effect of combined stresses on the fracture stress of gray cast iron over the tension-tension and the compression-tension fields of biaxial stresses. Their data, shown in fig. 13, are in fair agreement with the predictions made by Jelinek, et al[17]. Over the range of stresses shown by *A*, brittle fractures are observed and the data are in good agreement with the normal stress law for the fracture of brittle materials. As higher compression stresses are applied, fracture is obtained before the critical normal stress is reached as shown over region *B*. These effects are first noted in the range of stresses where cast iron exhibits increasing strains to fracture. As higher ratios of compression stresses are applied, greater strains to rupture are obtained. The data for ductile fractures in region *B*, therefore, cannot be ascribed to a fracture stress law; they become understandable when the strain damage principal is invoked if, in addition, it is assumed that less strain damage and consequently higher strains to rupture are obtained under correspondingly

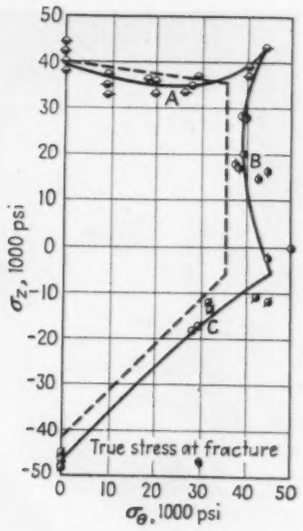

FIG. 12 — Fracture stress for 0-1 magnesium alloy.

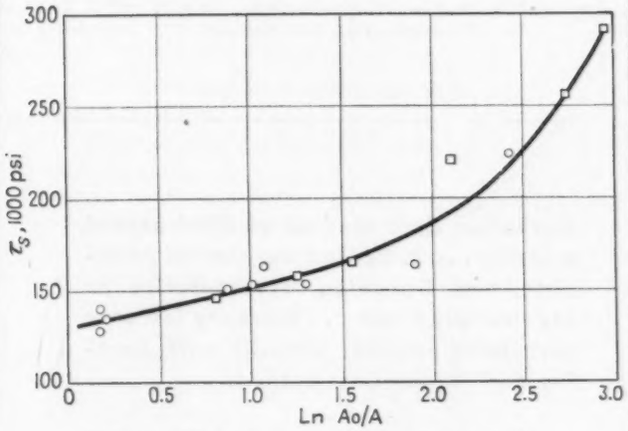

FIG. 14—Effect of prestrain under pressure on the shear stress for fracture.

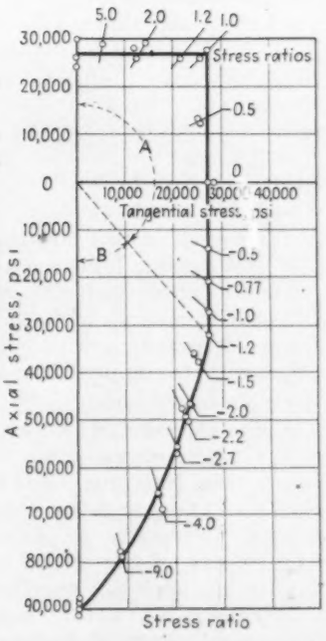

FIG. 13 — Fracture stress of gray cast iron under biaxial stresses. Stress ratio = axial stress ÷ tangential stress (after Grassi and Cornet).

Low

NEWLY elected ASTM president, J. G. Morrow, metallurgical engineer, Steel Co. of Canada, Hamilton, Canada

NEWLY elected ASTM vice-president F. E. Richart, research professor of engineering materials, University of Illinois, Urbana, Ill.

Corrosion data studied at 52nd annual meeting . . . J. C. Morrow elected president, first Canadian representative to receive this honor . . . Marburg lecturer correlates residual stresses with heating and fabricating methods.

A COMPREHENSIVE program, incorporating a heavy committee schedule and more than 60 formal technical papers, including such practical and timely subjects as low-carbon stainless, spot testing analytical methods, radiography, ultrasonic testing, high temperature alloys and a down-to-earth discussion on residual stresses in metals, received the attention of some 1900 registrants at the 52nd annual meeting of the American Society for Testing Materials, held in Atlantic City last week.

An innovation at this meeting was the utilization of the Tuesday luncheon as the medium for introduction of new officers, recognition of 40- and 50-year members and the president's address. These are functions normally conducted in conjunction with the annual dinner.

Newly elected officers introduced to ATSM members during the meeting were as follows: President, J. G. Morrow, metallurgical engineer, Steel Co. of Canada, Hamilton, Canada; vice-president, F. E. Richart, research professor of engineering materials, University of Illinois, Urbana, Ill. New members of the board of directors are: R. D. Bonney, assistant manager of manufacturing, Congoleum-Nairn, Inc., Kearny, N. J.; C. H. Fellows, head, chemical division, research dept., Detroit Edison Co., Detroit; H. F. Gonnerman, assistant to vice-president in charge of research, Portland Cement Assn., Chicago; N. L. Mochel, manager, metallurgical engineering, Westinghouse Electric Corp., Philadelphia; and M. O. Withey, dean of engineering, University of Wisconsin, Madison, Wis.

Announcement was made of the first national meeting of the society in the Pacific area, to take place in San Francisco the week of Oct. 10, 1949. Also, the 53rd annual meeting will be held in Atlantic City during the week of June 26, 1950, together with the ninth exhibit of testing apparatus and related equipment.

In his address "The Progress of ASTM," president R. L. Templin, assistant director of research and chief engineer of tests, Aluminum Co. of America, summarized some of his experiences and observations in the work of the society, emphasizing testing procedures.

The Charles B. Dudley Medal, presented annually for the paper of outstanding merit constituting an original contribution on research in engineering materials, was awarded to W. W. Buechner, R. J. Van de Graff, H. Geshbach and A. Sperduto, MIT; and E. A. Burrill and L. R. McIntosh of High Voltage Engineering Corp., for their paper entitled "An Investigation of Radiography in the Range from 0.5 to 2.5 Million Volts." The Richard L. Templin Award, presented for a paper describing new testing methods and apparatus, was given to W. T. Lankford, Carnegie-Illinois Steel Corp., for his paper "Hydraulic Bulge Testing of Sheet Metals." The Sam Tour Award, presented for the first time, for the purpose of encouraging research on improvements and evaluation of corrosion testing methods, was given to V. M. Darsey

Carbon Stainless

. . . Symposium Highlights ASTM Meeting

and W. R. Cavanagh, Parker Rust Proof Co., for their paper entitled "Apparatus and Factors in Salt Fog Testing."

Highlight of the technical phase of the meeting was the 23rd Marburg Lecture, delivered by William M. Baldwin, Jr., research professor, Case Institute of Technology, Cleveland, on the subject "Residual Stresses in Metals." Exploring the manner of formation of various stress states in metal, by heating, cooling, welding, casting, rolling and drawing, the speaker reviewed the progress that has been made in stress measurement and evaluation. Baldwin also outlined the adverse effects due to stress conditions and indicated the mechanisms whereby annealing and/or mechanical working can be utilized to eliminate harmful residual stresses.

Attention was focused on the growing interest in low-carbon stainless steel with a symposium on evaluation tests for stainless steels, which included the presentation of nine formal papers. A general introduction to the subject was given by H. W. Gillet, chief technical adviser, Battelle Memorial Institute, Columbus, in a paper entitled "Present Knowledge of Low-Carbon 18-8."

Pointing out that 18-8 is a boundary composition, sensitive to slight changes in composition, the speaker referred to the need for preserving the balance of the various components. Carbon is so powerful an austenitizer, for example, that reducing it below the customary level materially disturbs the balance, and thus the matter of austenite stability must be taken into consideration. On the other hand, it would be expected that an increase in chromium above 18 pct would improve corrosion resistance and would increase the tolerance for carbon and nitrogen. Such a change, however, necessitates rebalancing the composition, since the higher the chromium content, the greater the likelihood of production of the sigma phase. Sigma is high in chromium, and its production impoverishes the adjacent matrix, and sigma itself is extremely brittle.

Other aspects of the subject, particularly with respect to corrosion resistance and tolerance for carbon and nitrogen, were also discussed by Gillet, whereby the effects of chromium, nickel, copper, manganese, silicon, nitrogen, oxygen, oxide inclusion, molybdenum and boron, were appraised.

Observing that accelerated corrosion testing of welded joints must be used with caution because the three commonly-used tests do not give equivalent results, F. K. Bloom and M. E. Carruthers, supervising metallurgists, Armco Steel Corp., described a study whereby all three tests were used to evaluate welded joints. The report, entitled "Accelerated Corrosion Testing of Chromium-Nickel Stainless Steel Weldments," involved shielded metal-arc welded joints prepared from plate and sheet samples of standard types 304, 316 and 347 containing about 0.06 pct C, and types 304 and 316 containing 0.03 pct C max.

The investigation showed the following interesting results:

(1) The three corrosion test media differ markedly in their tendency to produce intergranular attack in the heat-affected-zones of types 304 and 316. Nitric-hydrofluoric acid was most potent, boiling 65 pct nitric acid caused slight attack, and boiling copper sulfate-sulfuric acid failed to produce intergranular attack.

(2) Weight loss or corrosion rates in either nitric-hydrofluoric acid or boiling nitric acid were not a satisfactory index of the degree of intergranular attack.

(3) Stabilized type 347 and low carbon 304 and

ASTM Marburg Lecturer W. M. Baldwin, Jr., research professor, Case Institute of Technology, Cleveland.

Newly Elected ASTM Directors

• R. D. Bonney, assistant manager of manufacturing, Congoleum-Nairn, Inc., Kearny, N. J.

• C. H. Fellows, head, chemical division, research dept., Detroit Edison Co., Detroit.

• H. F. Gonnerman, assistant to vice-president in charge of research, Portland Cement Assn., Chicago.

• N. L. Mochel, manager, metallurgical engineering, Westinghouse Electric Corp., Philadelphia.

• M. O. Withey, dean of engineering, University of Wisconsin, Madison, Wis.

316 showed no evidence of weld decay in any of the test media and were free of precipitated carbides in the heat-affected-zone.

(4) Boiling nitric acid selectively attacks pools of delta ferrite in weld deposits of types 316, 316 Cb and 318. This attack was peculiar to this reagent and was confined to the molybdenum-containing weld metal.

The relationship of intergranular corrosion in certain of the molybdenum-bearing steels and delta ferrite (sigma phase) was subjected to further scrutiny by W. O. Binder and C. M. Brown, Union Carbide and Carbon Research Labs., Inc., in their paper "Influence of Carbon and Molybdenum on the Intergranular Corrosion Resistance of Austenitic Chromium-Nickel Steels with and without Columbium."

To gain a clearer insight into the corrosion behavior of the five main types of 18-8 steels, in particular the molybdenum and molybdenum-columbium variations, comparative corrosion tests were made. The tests, which embraced steels containing 0.06 and 0.03 pct C max, indicated a cause for accelerated intergranular corrosion other than chromium carbide precipitation in the molybdenum-bearing steels; namely, precipitation of an intermetallic compound which has been identified by X-ray diffraction as sigma phase.

Although observation of certain precautions, such as adding a strong carbide-forming element and lowering carbon content to about 0.03 pct, minimizes the influence of carbide precipitation on corrosion resistance, subsequent testing of certain of these steels in boiling 65 pct nitric acid, after sensitizing for short periods of time, results in excessive attack which is intergranular in nature. Steels containing more than 2 pct Mo are most frequently affected by nitric acid after sensitizing, but increased corrosion is also observable in steels containing 2 pct Mo when columbium is present.

When first noticed, the loss of corrosion resistance was attributed to the precipitation of a small amount of carbon from austenite, but upon further study, it became apparent that such an explanation was untenable. For example, it does not account for the excellent corrosion resistance of the columbium-stabilized steels and the 0.03 pct C (max) steels without molybdenum. Furthermore, the loss of corrosion resistance is confined to the boiling 65 pct nitric acid test, and it is not observed in hot nitric acid containing hydrofluoric acid, or in boiling acidified copper sulfate solution, which are recognized as excellent tests for revealing intergranular susceptibility due to carbide precipitation. It is obvious that the breakdown of the low-carbon and stabilized steels in nitric acid is not a manifestation of carbide precipitation, but that it is probably the result of a phase change which, in nitric acid, affects the corrosion resistance of the steels in the same manner as does carbide precipitation. A study of steels containing 0.01 pct C max indicates that the phase is sigma.

The two major variables which control the properties of alloys at high temperatures are (1) chemical composition and (2) prior treatment. In recognition of the pronounced effect of prior treatment, an investigation was conducted at the University of Michigan, partial results of which were reported by J. W. Freeman, E. E. Reynolds, D. N. Frey and A. E. White, all associated with the university, in a paper entitled "The Influence of Conditions of Heat Treatment and Hot-Cold Work on the Properties of Low-Carbon N-155 Alloy at Room Temperature and 1200°F."

Low carbon N-155 alloy was selected for the study because the authors considered it as one of the outstanding alloys developed for use in gas turbines, and because it was reasonably representative of a number of the so-called superalloys which do not show pronounced age hardening.

The influence of solution treatment, aging treatment and hot-cold work on bar stock of N-155 were evaluated by means of physical properties at room temperature and rupture tests at 1200°F. Yield strength values (0.02 pct offset) at room temperature ranged from 30,000 to 134,000 psi,

while rupture strengths varied from 40,000 to 66,000 psi at 100 hr and from 35,000 to 56,000 psi at 1000 hr. The equivalent range in time for rupture under 40,000 psi was from 100 hr to an estimated 600,000 hr for the same bar stock with different treatments.

The above ranges were held to be greater than those resulting from wide variations in chemical composition and indicate the reason why it has not been possible to correlate composition of the chromium-nickel-cobalt alloys to properties at high temperatures.

One of the objectives of the investigation was to develop relationships which would permit checking the relative properties of any lot of low-carbon N-155 alloy by means of a few simple tests. The work has not yet progressed sufficiently to do so, and, as shown in fig.1, brinell hardness predicts yield strengths to a range of 30,000 psi. There was no consistent relationship between hardness and rupture strength.

Solution treatments above 2100°F, particularly prior to hot-cold work, resulted in excessively low ductility and brittleness in the rupture test. The specific effects of treatment conditions varied depending on the time period for rupture. Hot-cold work gave the highest strength at 1200°F for both long and short time periods. The major effect of aging was to increase ductility in the rupture test and reduce long-time rupture strength.

In an effort to account for the wide spread in stress values required to produce a given creep rate, G. V. Smith and E. J. Dulis, research laboratory, U. S. Steel Corp. of Delaware, Kearny, N. J., conducted an extensive investigation into the influence of deoxidation practice, heat treatment temperature and mode of cooling on 12 heats of normalized low-carbon steels of commercial manufacture. Results of creep and creep-to-rupture tests at 850°F for periods up to 3500 hr performed on these steels, which represented various refining and deoxidation practices, were reported by the authors in a paper entitled "Effect of Manufacturing Practice on Creep and Creep-Rupture Strength of Low Carbon Steel."

Under the conditions related above, it was found that, dependent upon the refining and deoxidation processes, the estimated stress for rupture in 10,000 hr ranged from 12,000 to 22,000 psi, and the observed stress to produce a minimum creep rate of 0.1 pct per hr ranged from 19,000 to 32,000 psi.

In general, the weakest of the openhearth steels tested was that deoxidized with the greatest amount of aluminum, and the strongest, that deoxidized with silicon (but no aluminum). The bessemer steels (other than a capped heat) were similar to one another in degree of deoxidation and showed remarkably uniform results. It is presumed, however, that the role of deoxidation in bessemer steels is as important as in openhearth steels.

The influence of type of refining process, bessemer or openhearth, was indicated to be minor, relative to the effect of deoxidation practice, but the range of materials investigated was not sufficiently extensive to permit comparison of openhearth and bessemer steel over the whole range of deoxidation practice.

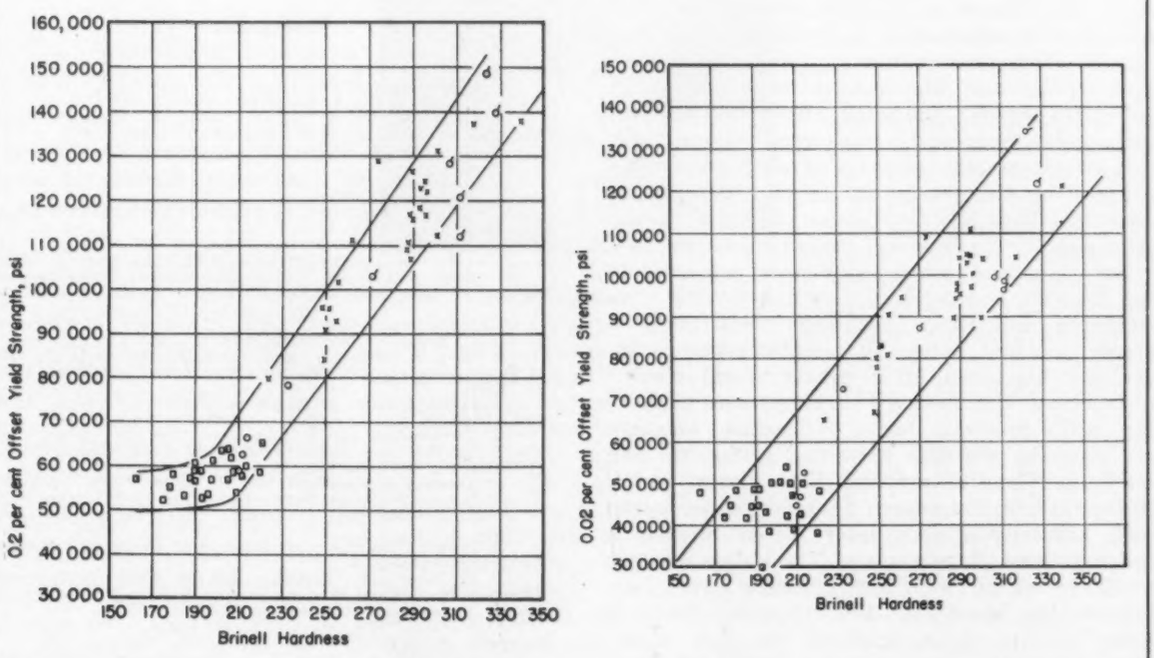

FIG. 1—Relationship between yield strength and hardness of low carbon N-155 alloy at room temperature. Circles indicate hot rolling and aging; squares indicate solution treatment and aging; sigmas represent hot rolling and hot-cold working; and X's represent solution treatment and hot-cold work.

French Cupola Refractory Practice

A REVIEW of French cupola refractory practice, which stressed the use of acid monolithic linings, was given in a paper read at a recent meeting of the British Iron & Steel Research Assn. The paper, as reported in the Foundry Trade Journal (London), stressed the development of acid monolithic linings and gave tabulated information concerning refractory constitution, particle size, clay content, degree of compaction, method of applying and lining dimensions. A feature was the emphasis on not-too-thick linings; a "thermal-equilibrium" profile at 6 to 8 in. was said to be ideal. Two examples of hot-blast water-cooled cupolas were described; the first had melted 10,000 tons of iron over a period of 8 years without relining; and the second used a lining only 1.4 to 2.6 in. thick, which was spray cooled. A German paper presented at the meeting was similar to the French in its main recommendations, differing only in the particular; for instance, the particle gradings for a composite monolithic acid refractory comprising quartz and a fireclay (blended artificially) used more of the smaller pieces of quartz and a finer grinding of the clay than was given by the French. Additionally, it was stated that bricks were often used in the upper portions of German cupolas, where the body was monolithic. Lining consumption was given as 143 to 154 lb per ton melted. Converters in Germany were said to have followed a similar trend towards monolithic linings, though silica bricks were still used for parts most severely attacked. Comparable data were 50 to 75 charges for a 2-ton siliceous-brick-lined converter against 60 to 100 for a rammed lining.

Fracture of Ductile Metals

(CONTINUED FROM PAGE 95)

higher compression stresses. Conclusive evidence in favor of this assumption will be discussed next.

In a series of extremely illuminating experiments, Bridgman[19] determined the effect of prestraining under high hydrostatic pressures on the subsequent flow and fracture stresses obtained under atmospheric pressure. The flow stress and the state of stress at fracture were calculated by application of Bridgman's analyses for the stress distribution in the necked region of a tension bar. The instantaneous flow stress (effective stress) following any prestrain history under hydrostatic pressures was a function of the strain (effective strain) only, independent of the previously applied hydrostatic pressure. Thus the flow stress of metals is uninfluenced by hydrostatic pressure history.

But those specimens which were subjected to the highest hydrostatic pressures during prestraining and those specimens prestrained a greater amount under hydrostatic pressure invariably fractured after greater total strains to fracture. The observed shear stresses at fracture after prestrain under hydrostatic pressure are given by the data presented in fig. 14. The solid line is the average flow stress curve. Higher fracture stresses on the flow stress curve were obtained after greater initial prestrains under hydrostatic pressures. These data are not easily reconciled with any fracture stress law. Rather they show that the "apparent fracture stress" is merely a point on the flow stress curve when the bar ruptures. Evidently less damage, or even "healing" of microcracks, results by straining under high hydrostatic pressures. Consequently higher strains to rupture are possible by working metal under hydrostatic pressures. Recent evidence presented by Sachs[20] also confirms the beneficial effects of prestraining under increasing hydrostatic pressures.

Acknowledgment

The author thanks T. Tietz and T. Hazlett for reviewing the arguments in this article and for their helpful comments. He also thanks Mrs. G. Pelatowski for the preparation of the figures.—Ed.

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New Production Ideas . . .

A cylindrical grinder, a contour mill, semi-automatic tapping machines, a special machine for chamfering connecting rods, a continuous processing system, an electro-analyzer, a universal testing machine, a continuous measuring gage, melting furnaces, twin strainers, a belt conveyer scale, and a trolley conveyer lubricator are described in this issue.

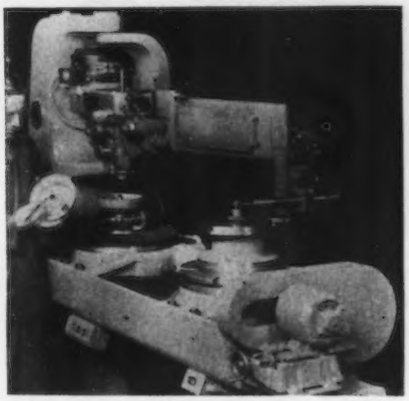
Cylindrical Grinder

A GENERAL purpose, cylindrical grinding machine has been designed for small lot manufacturing in large or small shops, tool rooms and for training purposes. Called the Grindwell, it has

a capacity of 28 in. between centers and will swing 12-in. diam work. The machine is equipped with a 12-in. diam grinding wheel powered by a 1 hp motor, with Microsphere bearings supporting the wheel spindle. A graduated swivel base permits swiveling the wheel head for unusual grinding setups or for truing an angle on the wheel face. The headstock has an infinite speed range from 85 to 483 rpm, rheostat controlled. There are only two revolving parts; the motor spindle and the face plate. Either live or dead spindle operations may be used. V-belt drive is used. Two speed hand traverse is standard; the slow speed for grinding fillets or shoulders, the fast speed for setup. For taper grinding the table may be swiveled. *Landis Tool Co. For more information, check No. 1 on the attached postcard.*

Contour Mill

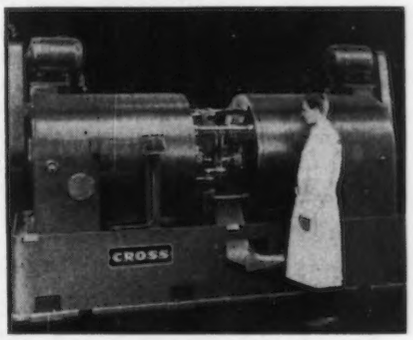
THE new contour mill No. CM-12 with rotary master, variable ratios and automatic cycling, profiles or grooves either the inside of outside periphery and the top of cams or cam-like shapes to close tolerances and with high surface finishes. Basically, this is a tracer-controlled swivel head milling machine that employs rotary tables and operates at reduction ratios ranging from 2:1 to 10:1. The machine profiles all conventional cam shapes that do not include negative angles, and most interrupted cam shapes that lend themselves to continuous cycle profiling. Two 16-in. roller bearing rotary tables are mounted on the bed of the machine and are geared together and powered by an in-



finitely variable speed unit that provides the required rpm. Cutter and tracer spindles are mounted on a rugged tracer extension arm. Reduction ratios are set by a micrometer bracket. During each cycle, all operations are completely automatic. The workpiece shape is generated by the shape of the master and the cutter is fed into the work at a fixed depth by the tracer-feed cam. Spindle speeds are 300 to 10,000 rpm. If cam or workpiece is thin, several can be profiled at once by stacking. All machine elements are individually motor driven. *George Gorton Machine Co. For more information, check No. 2 on the attached postcard.*

Special Machine Tool

CHAMFERING connecting rods at the rate of 1000 pieces per hr with one operator is said to be possible by a new special machine tool that is designed for maximum automaticity. The operator, paced



by the continuous automatic cycle, merely loads the parts and presses the cycle button. Unloading onto an automatic conveyer for the next operation is also automatically accomplished. Quality is assured by tool heads that align the work from the main bore for perfect concentricity and by single point carbide tools to generate the chamfers. Other features include complete cam operation and safety clutches for protection against improper loading and off-size parts. *Cross Co. For more information, check No. 3 on the attached postcard.*

Lathe Turrets

TWELVE position indexing is announced as standard on Enco turret tool post models. One application involves three operations at different indexing angles of the turret block and savings on production time of up to 45 pct are reported. The feature of indexing each tool at 30° intervals is claimed to often eliminate second operation setups. Twelve position indexing is said also to allow the use of

standard tools without regrinding in addition to providing a quick setup for threading. Reindexing accuracy within 0.0005 in. is claimed. The turrets are available in 33 different models. *Enco Mfg. Co. For more information, check No. 4 on the attached postcard.*

AC Welder

A NEW standard 200-v ac welder permits welding on both light and heavy gage materials with the one machine. Small size diameter electrodes can be used without waste or damage. This unit known as Eutecarc welder is mounted on casters. Boosters, stabilizers and other auxiliary attachments are not employed in the design. Accurate stepless heat control is said to be provided over the welding range, and amperage selector control allows selection of small amounts of current, ranging from 20 to 285 amp. The machine has a drip-proof case with natural convection cooling. *Eutectic Welding Alloys Corp. For more information, check No. 5 on the attached postcard.*

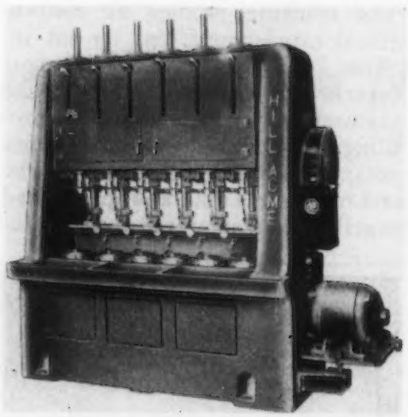
Power Shear

THE new Di-Acro power shear is a precision built unit designed for close tolerance and high speed production shearing. The cutting range extends from the lightest of materials to its maximum capacity of 16 gage sheet

steel. The shear will cut square, rectangular or other straight sided blanks, shear narrow strips and trim edges of sheets and parts. A protracting gage for squaring and mitering is supplied. Material length gages can be mounted in front of the shear for trimming of parts or in back for sizing stock. The shear is operated by a non-repeating positive action clutch controlled by a foot bar or hand lever. A combination blade guard and adjustable hold-down bar insures safe high speed operation. Two models are available with 12 and 24 in. shearing capacities. *O'Neil-Irwin Mfg. Co. For more information, check No. 6 on the attached postcard.*

Tapping Machine

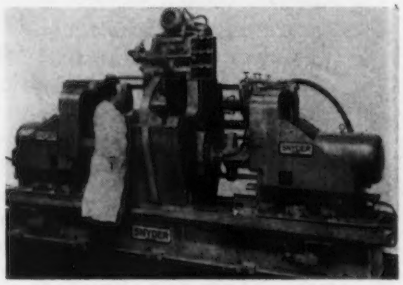
A NEW semi-automatic tapping machine that is adaptable for tapping couplings or nuts is built in 6- and 8-spindle models and in standard sizes of 1 and 2 in. Larger sizes are built in 4- or 6-spindle design. These coupling tappers have integral designed housing and truss mounted on a box type base. Spindles are splined



and independently operated by a worm drive mounted on anti-friction bearings completely housed and running in oil. Worm cams and lifting mechanism are totally enclosed in the truss assembly. Spindles have 8-in. travel and spindle speed changes are obtained by pick-off change gears. The tapping machines are designed for constant speed motor drive through multiple V belts driven by a general purpose motor of horsepower for the number of spindles on the machine. *Acme Machinery Div. Hill Acme Co. For more information, check No. 7 on the attached postcard.*

Special Purpose Machine

A NEW automatic cycle machine has been designed for drilling, counter-sinking, rough boring, and semi-finish reaming automotive transmission parts. The workpiece is a transmission planet carrier and parking lock gear assembly and is located and clamped in special, air-operated, diaphragm chucks. The machine is equipped with a four station, Geneva operated trunnion, on the right side of which is an 18-spindle multiple drill head with one master head carrying three 6-spindle pot heads. On the left side



of the trunnion is a 6-spindle head, also with a master head but with a single 6-spindle pot head. After loading and unloading at Station 1 the machine automatically indexes to station 2 where the left and right heads each drill and countersink six holes. At Station 3 the right hand head bores six holes, and at Station 4 semi-finish reams the six holes. Work cycle is automatic and the machine can be operated by unskilled help. Tools are high speed steel running at 70 sfm. Stroke is 0.008 ipr. Ten, 5 and 2 hp motors provide the power for the right hand head, left hand head, and Geneva index, respectively. Production rate is 75 cycles per hr at 80 pct efficiency. *Snyder Tool & Engineering Co. For more information, check No. 8 on the attached postcard.*

Magnesium Safety Blocks

MAGNESIUM safety blocks have been introduced for use in metal forming presses as a safeguard to men working within the opening of the press. These specially-alloyed extruded magnesium blocks are available in any required lengths and in three sizes to cover a wide range of press capacity. Extreme light weight, correct shapes for best press application, high unit strength and maximum resistance to shock loads are additional features. *Magline, Inc. For more information, check No. 9 on the attached postcard.*

Electroanalyzer

SIX sets of fixed anode-cathode positions in a new electroanalyzer permit simultaneous determinations of quantitative mea-

surements of the electrodeposition of metals. Air or gas agitation is controlled at each station. A selector switch permits reading voltage at any station. A maximum of 5 amp dc can be applied to any or all of the stations. Single sta-

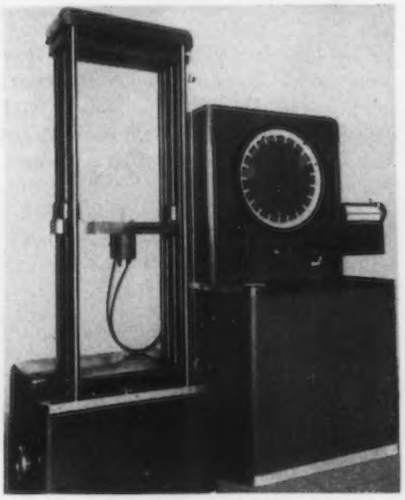
tions may be removed with the snap of a switch. Current flowing through the circuit is controlled by a knob on the front panel. A voltmeter reading 0 to 8, and an ammeter reading 0 to 5 are mounted on the front panel. Polystyrene electrode holders operate with finger pressure to support electrodes. *Central Scientific Co. For more information, check No.* 10 *on the attached postcard.*

Continuous Processing System

NINE operations are performed in a system for continuous processing brass screw bases for house fuses through a series of cleaning, annealing and pickling operations that require but two relatively small, compact pieces of equipment. The work moves mechanically at any required rate through every step in the process, requiring no labor other than at the charging end. From the discharge of the pickling unit the work goes into a conveyer or tote boxes. Specifically, the metal pieces, placed on a mesh belt conveyer, move into a hot spray wash section, thence successively through a drain-off, cold water rinse, another drain-off, annealing oven, cooling vestibule and spray cooling section emerging at the other end ready for the pickling unit. The pickling section consists of a series of perforated stainless steel drums rotating in stainless steel tanks for the consecutive operations of acid pickling, bright pickle with bichromate solution and two rinses. In the final drying, all traces of moisture are removed by electrically heated air recirculated by a large capacity fan. The work is discharged fully stress relieved, clean and bright, ready for the next process. Belt conveyer and drums are equipped with variable speed motor drives to control rate of travel and production. Temperatures are thermostatically controlled. The size, capacity, number and arrangement of functional elements can be designed to fit any desired process. *W. S. Rockwell Co. For more information, check No.* 11 *on the attached postcard.*

Low-Range Testing Machine

A NEW universal testing machine having a capacity of 5000 lb uses hydraulic and pneumatic load cells as load-sensitive elements in the weighing system, both operating a Tate-Emery in-



dicator. Four standard load ranges are provided by the hydraulic cell: 5,000, 1,000, 200, and 50 lb. Two additional ranges of 10 and 2 lb are provided when specified, by means of an air cell. These machines are suitable for testing fine wire, light metal foils, light structures of metal, plastic, or wood. Tension space may be 3⅜ to 51 7/16 in. and compression space 0 to 48 in. Clearance between vertical screws is 18¼ in. All loads are indicated on a 24-in. masked dial with a 66-in. scale. Tension and compression loads are applied by a straining cross-head that is motor-driven by two vertical screws, giving a 48-in. stroke. A recorder may be used with the machine and will plot stress-strain curves with 10-in. ordinate for one-half and full capacity of any range. *Baldwin Locomotive Works. For more information, check No.* 12 *on the attached postcard.*

Comparator Test Head

MORE extensive application and wider utility is provided for the GE metals comparator by a new test head. For use on flat surfaces, particularly of large equipment, the test head was developed for those instances in which the conventional test unit, the test coil, is inapplicable. By comparing ferrous or nonferrous parts with a known standard reading set on the dial of the instrument, the metals comparator provides a quick, nondestructive quality check on such characteristics as composition, heat treatment, or hardness. The contact face of the new head consists of a ring separated from a concentric core by an air gap, thereby forming a radial magnetic path across which the test piece is placed. Three inches long, it can be supplied in various face diameters depending upon the application. *General Electric Co. For more information, check No.* 13 *on the attached postcard.*

Continuous Measuring Gage

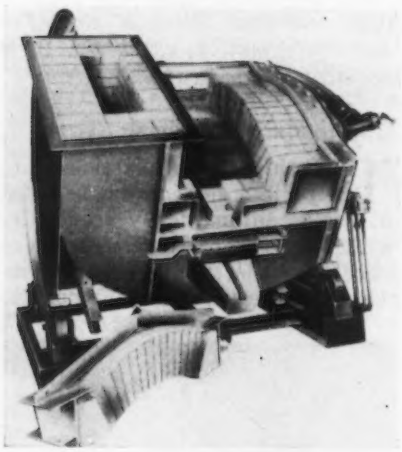
THE thickness of plastic coating deposited on copper electrical wire is automatically controlled with a new continuous measuring gage. The Electricator, that transmits electrical impulses when di-

mensions are out-of-tolerance, automatically controls the machine so that a uniform coating thickness is maintained. Parallel precision rollers contact the coated wire, maintaining their parallelism regardless of thickness. Pressure can be varied

to suit hardness of coating material. Similar gages are available for metal rods and strip material. *Federal Products Corp. For more information, check No.* 14 *on the attached postcard.*

Melting Furnaces

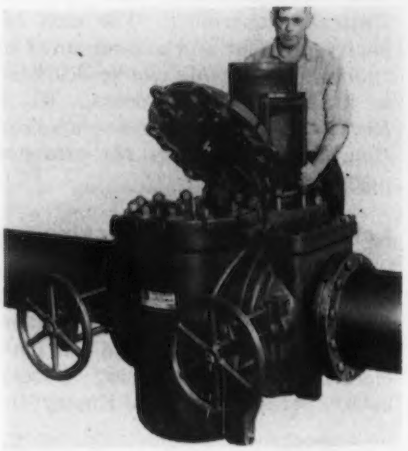
REVERBERATORY tilting furnaces of the Sklenar type for the melting of ferrous and nonferrous metals have capacities of 350 to 20,000 lb and are said to be capable of producing 13 to 21 melts per day. They are self-contained units fired with oil or gas and the draft is supplied by a blower that is a part of the furnace. Metal is charged through a hopper that is also the exhaust from the combustion chamber. The metal is preheated and melted in suspension in the hopper and then trickles down into the metal bed. In this manner



no cold metal ever reaches the molten bath. It is not necessary to shut off the flame to charge additional metal. The combustion chamber is heated by the same fuel as is used to melt the metal in the hopper. Sklenar type melting furnaces are accessible for skimming, refining, alloying and inspection during the entire melt. Tilting mechanism is governed by the size of the furnace. *Bellevue Industrial Furnace Co. For more information, check No.* 15 *on the attached postcard.*

Twin Strainers

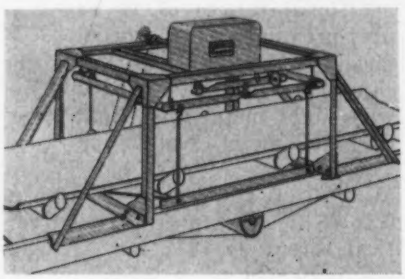
A NEW line of twin strainers have been built in sizes up to 24 in. for removing foreign matter from water, oil, and other liquids at pressures up to 125 and 250 psi. Constructed with two strainer chambers in one body either chamber can be shut off for removing and cleaning the strainer basket without interruption of flow. There are no moving parts except valve mechanisms. Pressure drop is said



to be low due to straight line flow and large basket area. Strainers have cast Meehanite bodies with steel plate doors. Baskets are of hard copper mesh on rigid frames. Electrolysis is said to be minimized through selection of materials. *Elliott Co. For more information, check No.* 16 *on the attached postcard.*

Belt Conveyer Scale

THE Transportometer can be installed on any existing horizontal, inclined or declined belt conveyer of any width or speed, to automatically and continuously weigh, indicate and totalize the tonnage at any rate up to 2000 tons per hr. The scale is assembled and shipped as a



complete unit, requiring fewer than a dozen bolts for its complete installation. Transportometers are available for automatically regulating preceding feeder conveyers, rotary valves, etc., and can be provided with remote mounted chart recorders, tonnage indicators, duplicate totalizers, and predetermined batch counters. *Sintering Machinery Corp. For more information, check No.* 17 *on the attached postcard.*

V8 Series Valves

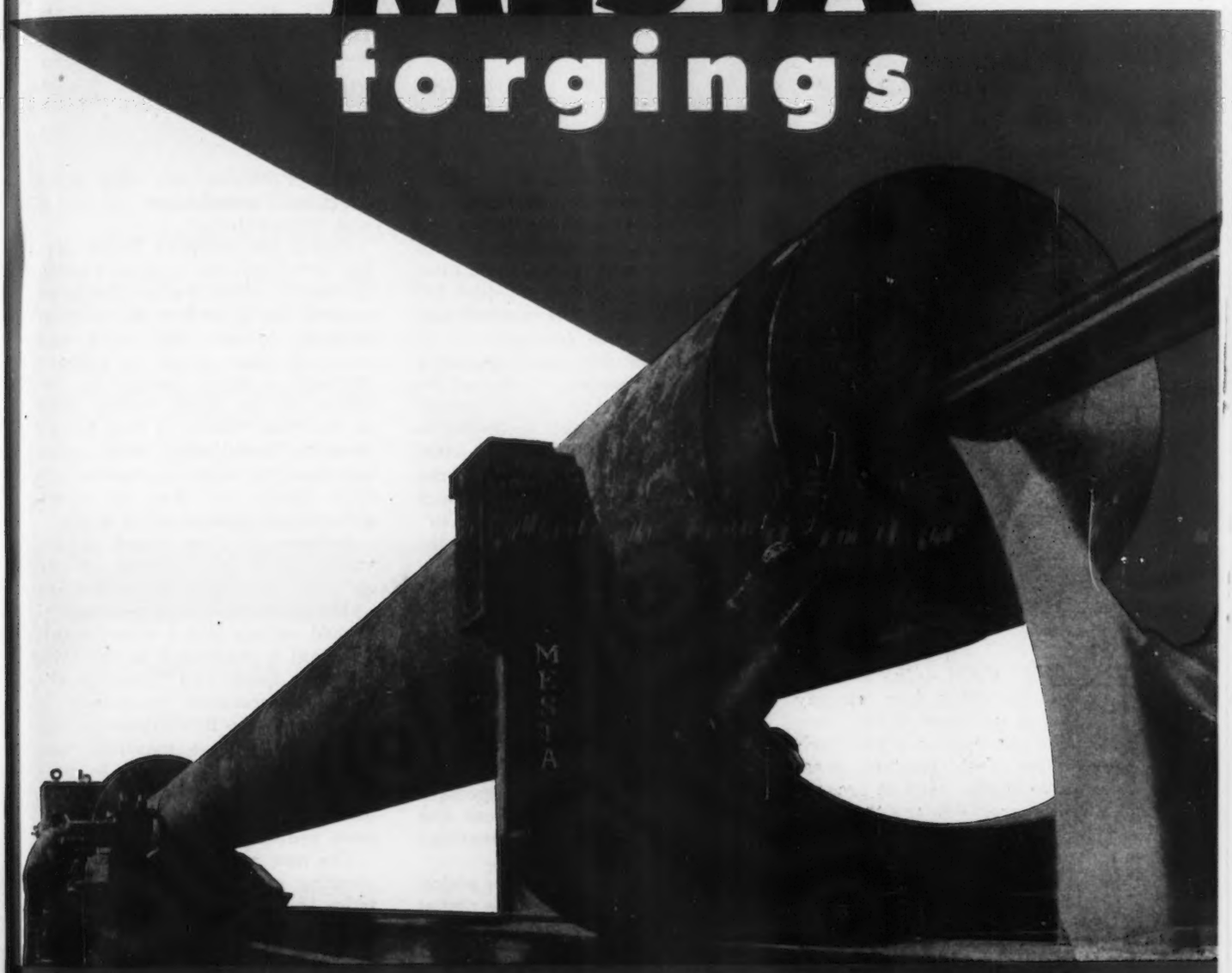
FOR heavy-duty industrial equipment and hydraulic presses, a new V8 series oil-hydraulic control valves has been produced for large volume oil-hydraulic systems. The valve will handle 80 gpm at operating pressures up to 1000 psi. Various models are available for operating up to as many as three single-acting or double-acting hydraulic cylinders. Design features include the Hydreco hollow-plunger construction with built-in check valves and adjustable differential type relief valves. *Hydraulic Equipment Co. For more information, check No.* 18 *on the attached postcard.*

Lubricator

AN automatic lubricator for trolley wheel bearings and pins on a Link-Belt twin T-rail con-

veyer, operating through a core oven, lubricates bearings at the hubs on the inside and outside of the wheels. To accommodate the construction of this conveyer it is necessary to locate the lubricator, including a 2-gal reservoir, 8 in. above the bearings. The operation is automatic. As each pair of wheels pass the lubricator the wheels trip triggers that automatically release jets of oil fogged air directly into the wheel bearings. Air from the plant line is stepped down to proper operating pressure, approx 40 psi, by a Norgren regulator. A valve is actuated by the trigger and the oil fog passes through the hose directly to the bearings and pins, completely coating them with an oil film without any drip. *J. N. Fauver Co. For more information, check No.* 19 *on the attached postcard.*

MESTA forgings



Mesta facilities are capable of producing the largest forgings used by industry, with rigid quality control, from raw materials for producing carbon and alloy steel ingots to completion of the finished product.

The illustration shows a 70 foot forged steel column, for a 14,000 ton forging press, being turned and bored on a Mesta 84" lathe.

DESIGNERS AND BUILDERS OF COMPLETE STEEL PLANTS

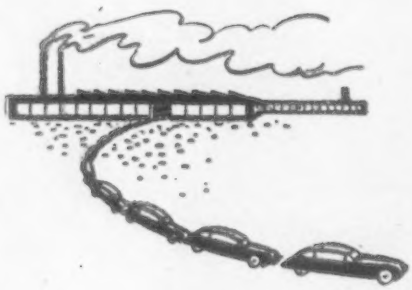
MESTA MACHINE COMPANY

PITTSBURGH, PA.

Assembly Line . . . .

WALTER G. PATTON

• Reo introduces a new truck engine with wet cylinder sleeves and overhead valves . . . Dearborn Motors announces huge research program in agricultural mechanization . . .



LANSING, MICH.—The automobile industry has already had a preview of two new passenger car engines: The high compression Kettering-type overhead valve engine used at present in Cadillac and Olds and the Hudson L-head engine with a special, high compression aluminum head. (THE IRON AGE, June 30, 1949, p. 72.) Last week wraps were taken off the new Reo Gold Comet heavy duty overhead valve truck engine. This is the first completely new truck engine to be announced since the war. The engine is designed particularly to pull heavy loads over the highway at high speeds.

The new Reo engine will power the company's E-22 truck series, covering a range of 17,000-22,000 lb as a truck and 22,500-38,000 lb as a tractor. The company feels the new engine will meet the requirements of about 45 pct of the country's truck owners.

This new 331 cu in. engine has many interesting engineering features, including wet, removable cylinder sleeves, a "square" bore and stroke (4⅛ x 4⅛), integral manifold and cylinder head and a Houde viscous damper using Silicone fluid to reduce vibration. Other features include the use of sodium-cooled exhaust valves and a seven-bearing crankshaft with Tocco-hardened journals and pins. The new Gold Comet develops 140 hp at 3200 rpm. It is the first new Reo engine in 20 years.

Use of the wet sleeve principle facilitates repairs which can be made without the aid of special tools and equipment, according to Reo engineers. The cast steel sleeves are kept watertight by the use of an overlapping engine block gasket. Two neoprene seals are used at the lower end of the sleeve.

Another argument favoring the use of a wet cylinder sleeve is that this design provides uniform thickness throughout the sleeve length, insuring better heat control, better piston fits and longer piston life. The cast cylinders are, of course, interchangeable for all six cylinders.

In its new engine Reo specifies connecting rods of identical size and weight. All main bearings are the same.

The new engine uses four piston rings, three rings above the piston pin and one below. Pistons are bronze-plated to eliminate scuffing during the break-in period.

FRONT-END styling of the new Reo models has been changed substantially. The curved radiator grille has been redesigned, chrome trim has been added and a new one-piece bumper is used.

Cab interiors have been restyled and improved. Instruments are conveniently located at the left side of the cab directly in front of the driver.

The new Reo frame is cold riveted throughout its length and reinforced with five heavy cross members. A curved tubular steel support has been installed under the flywheel housing.

The new trucks are designed to permit easy attachment of accessories. Provision has been made for an air compressor, air cooler and tachometer.

Using wet cylinder liners, Reo has developed an unusual cooling system in which water circulates around the cylinders in both directions toward the front and rear. Cooling water is pumped through a water gallery to the center of the block rather than at the front. Water is then forced from the block jacket to the cylinder head through 14 nozzle jets that direct the flow of water around the exhaust valve seats.

Instead of the usual single water outlet at the front of the cylinder, Reo forces the water out of the head through three equally-spaced outlets into a water manifold that is graduated in size. The cylinder head and valve mechanism is removable as a unit.

According to Reo engineers, the new Reo exhaust manifold has been especially designed to provide uniform reduction in gas velocity so that back pressure has been reduced to a minimum.

The new models retain the easy steering and handling characteristics that have been a feature of Reo trucks for a number of years.

Compression ratio of the new engine is 6.4 to 1. Maximum torque is 260 to 2200 rpm.

According to William M. Walworth, Reo's chief engineer, the new Reo engine develops more usable horsepower than any six or eight cylinder truck engine of comparable displacement.

•

Dearborn Motors Expands Farm Research Program

Detroit

• • • **Announcement** of a greatly expanded research program, including the construction of a $2.5 million general office building, laboratory and parts warehouse, was made this week by

WHEELABRATOR®

offers you greater tonnage, sparkling clean castings at lower costs . . .

Labor Savings and Increased Production pays for Wheelabrator Tumblast and Dust Collector in 18 months at Aurora Metal Company.

The Airless Wheelabrator has proved to be a profitable investment for the Aurora Metal Company. It produces 340 more castings per hour than the former airblast cleaning method. Castings are cleaned right down to the virgin metal, and the men are able to work without respirators. It will pay you to check the benefits of Wheelabrating as it applies to your business. Write today for complete information and thorough engineering analysis of your cleaning problems. There are no obligations.

PARTS CLEANED: Aluminum Bronze and Silicon Bronze Vacuum Die Castings for Centrifugal Pump Impellers 3⅛" diameter to 11" diameter, weighing from 1½ lbs. to 19 lbs. each.

FORMER METHOD	WHEELABRATOR METHOD
EQUIPMENT Airblast Cabinet	**EQUIPMENT** 20" x 27" Wheelabrator Tumblast (2 cu. ft. capacity)
PRODUCTION Average; 20 pieces per hour	**PRODUCTION** Average; 360 pieces per hour

Before Wheelabrating.

After Wheelabrating. Castings are clean; all traces of sand and light flas removed.

SAVINGS

Cost records have shown that labor Savings alone will pay for the cost of both the Wheelabrator Tumblast and the Dust Collector in 18 months.

Other WHEELABRATOR ADVANTAGES

Consumes less power than former sandblast method. Workers are happier and produce more under better working conditions. There is less costly hand work as fins are removed due to the thoroughness of Wheelabrating.

American

WHEELABRATOR & EQUIPMENT CORP.

510 S. Byrkit St., Mishawaka 3, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

Frank R. Pierce, president of Dearborn Motors Corp., national marketing organization for Ford tractors and Dearborn farm implements.

The new buildings will be located on a 45-acre site at 15 Mile Road near Coolidge, just east of Birmingham and about 7 miles north of the Detroit city limits. Construction is starting immediately. The parts warehouse is expected to be completed by the end of the year. The entire building should be ready for occupancy late in the spring, Mr. Pierce said. Architects are Giffels & Vallet, Inc., Detroit.

The three-story office building will provide 85,000 sq ft of floor space. Laboratory and warehouse facilities will occupy 165,000 sq ft in a separate building. Ralph E. Hunt, manager of Dearborn Motors engineering and manufacturing divisions, will be in charge.

Mr. Pierce said the objective of the company's new research program was both to expand its research into new methods of agricultural mechanization and to improve existing farming methods.

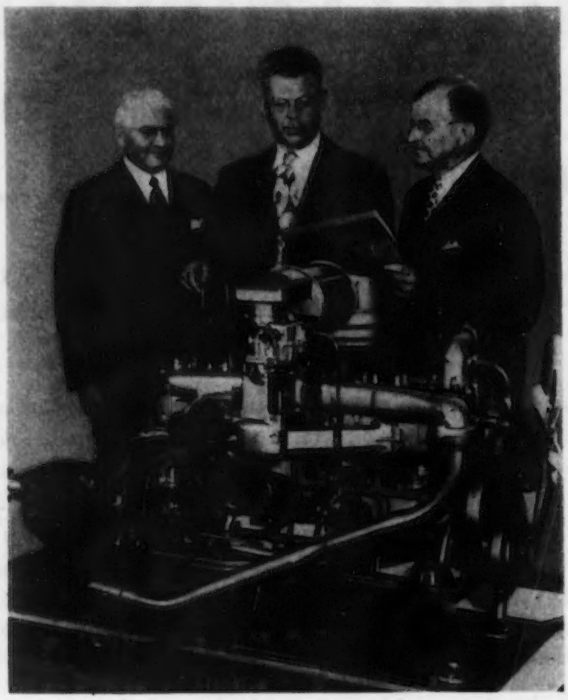
In addition to its new building program, Dearborn Motors plans to continue the firm's testing at Deer Lake Hills farm, Clarkston, Mich. The company will also continue its extensive soil and implement testing in various sections of the country.

At the present time, Dearborn Motors employs about 450. As many as 100 new employees may be added by the time the new research program is in full swing, Mr. Pierce said.

Last year Ford produced and Dearborn Motors sold about 20 pct of all the wheel-type tractors marketed in this country. Approximately 104,000 tractors and 500,000 implements were moved into the hands of owners through Dearborn's dealers and distributers. Despite the loss of 7000 tractors during the recent Ford strike, production for 1949 is slightly higher than the 1948 total.

Selling farm equipment is just about "back to normal," Mr. Pierce told the press last week. Black markets have disappeared, he said, and the reverse of black marketing—price cutting—has reappeared.

Estimated production capacity of the entire wheeled tractor industry is about 500,000 units, Mr. Pierce said.



HUDSON HOT-ROD: *Shown in the photograph is a Hudson six-cylinder engine equipped with a special aluminum head. Utilizing* 100 *octane fuel at a compression ratio of* 9.3 *to* 1, *this engine gives a top speed of well over* 100 *mph. Discussing the new engine are: S. G. Baits (center), first vice-president and general manager of Hudson; A. E. Barit (left), Hudson president and G. H. Pratt, vice - president in charge of sales.*

Lincoln Cars Equipped With GM Transmissions

Detroit

• • • **This week Lincoln** and Lincoln Cosmopolitan cars came off the assembly lines at Lincoln and Mercury assembly plants throughout the country for the first time equipped with GM-built Hydra-Matic transmissions. Contrary to earlier reports, the Mercury is not being equipped with Hydra-Matic.

In this connection, it is interesting to note that the Ford engine is rated at 100 hp, the Mercury at 110 and the Lincoln at 152. Because of the wide gap between the Lincoln and Mercury engines, some engineers believe Ford has no plans for adding Hydra-Matic to the Mercury. It is known, of course, that Ford engineers are continuing their intensive work on an automatic shifting device for the Mercury and Ford models.

Extensive changes were required in the Lincoln models. For instance, a new 3.37 axle is being used instead of the 4.27 axle specified with overdrive. A new bell housing is necessary. A new removable cross member had to be added to the frame to facilitate servicing the new unit.

Also, the propeller shaft has been shortened 4½ in. The accelerator linkage has been changed and a new steering column and shift control have been installed. Narrower wedge belts are used on the fan and generator to slow down the fan to nine tenths the normal speed. A five-bladed fan replaces the former four-bladed fan.

In addition, a new steel plate has replaced the cast iron flywheel formerly used. Some minor changes have been made in the crankshaft and the carburetor idler. New rubber engine mounts are being used.

The new transmission is offered as factory-installed equipment at extra cost of $200. Lincoln dealer personnel have already been given intensive shop instruction on how to service the new transmissions.

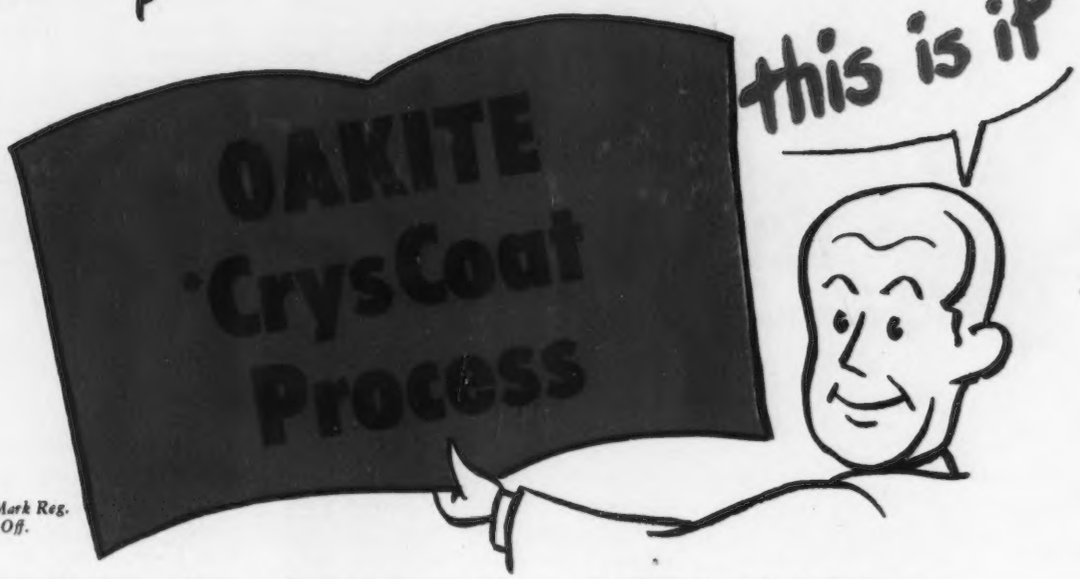
Orders 5000 Reo Trucks

Lansing, Mich.

• • • **Reo will build** 5000 trucks for the Ordnance Dept., U. S. Army, at a cost of approximately $31 million.

Under terms of the new contract, Reo will start delivery of the 2½ ton 6 x 6 trucks in March, 1950.

if you're looking for a LOW-COST way to prepare metal surfaces for painting



*Trade Mark Reg. U. S. Pat. Off.

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The OAKITE CrysCoat PROCESS prepares surfaces for painting at amazingly *low cost per 1000 square foot.* It (1) removes light soils; leaves your surfaces uniformly clean: (2) develops on metal an inert, microscopically thin phosphate base-film that anchors paint to metal and localizes under-paint corrosion: (3) prevents rusting between cleaning and painting procedures.

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Washington . . .

EUGENE J. HARDY

• Army says German cartel system is destroyed . . . Big steel groups now broken up, will be sold . . . Mr. Steelman defines defense planning responsibilities.

WASHINGTON — Army Secretary Gordon Gray, while agreeing that considerable work is yet to be done in breaking up the huge Nazi industrial combines, categorically denies that General Clay's military government had been either lax or ineffective in carrying out the decartelization program under Law 56.

This is evident in the firmly worded statement issued by Mr. Gray in endorsement of Assistant Secretary Voorhees' findings and recommendations concerning the recent report of the Ferguson committee. The latter's job (under appointment by former Secretary Royall) was to make a study of decartelization progress.

From the Army's viewpoint, "confusion" has been caused by loose use of the word "decartelization." The military contends that some of the large German industrial enterprises have been called "cartels" when actually they were no more nor less than big business or, as government economists might term them, "concentrations."

To begin with, according to Mr. Voorhees whose chief problem is to handle affairs concerning the occupied nations, the back of the cartel system was effectively broken by two swift moves early in the occupation. These were (a) the breaking up of the German banking monopoly which had a stranglehold on industry and (b) deconcentration of the interlocked Ruhr industries. The latter had been seized by the British shortly after the war ended and before the Bi-zonal government was set up. After the Bi-zonal agreement became effective in January 1947, General Clay was successful in getting steps taken toward decartelization.

"These industries have been seized," says Mr. Voorhees, "and now under a bipartite plan are being placed under trustees for operation, pending reorganization. This plan includes companies dealing in iron, steel, coal and many subsidiaries in other fields."

THE assistant secretary also cites the committee report to show that out of 1500 possible cases, an estimate at best, some 1100 cartel-like agreements have been ended. Of the remainder, proceedings have been taken against 100 more which are borderline cases where it must be decided whether they are cartels or merely concentrations.

Moreover, the Army contends, United States control of foreign trade through the Joint Export-Import Agency automatically rules out any danger of cartel operations. It further sees this control reserved in any future changes in occupational authority.

The case of I. G. Farben industries is cited as an example of what the Army has done. Of 38 Farben properties in the American zone, about 30 have been rooted out for independent operation and the Ferguson group agrees that effective competition now exists.

However, the committee recommends that these separate units be sold. The Army says it will do this as fast as the legal titles can be cleared.

As a contrasting case, the Army uses the example of the GHH properties (Guttehoffnungschuette, A. G.). This was not considered a cartel even though completely integrated and involved not only iron and steel but coal, coke, oil and other products. It was designated as an excessive concentration and as such will be liquidated by the Steel Trustee Assn. program which has eventually been agreed to by the British.

The Ferguson committee recognized that advice of Mr. Clay's economic staff, who feared undue haste would slow down recovery, has been a large factor in delay. But it hints that General Clay may have taken the advice too literally. It cites the fast break-up of the Farben setup as not having adverse effects.

The Army contends that the Farben case is not typical, pointing out that Farben properties were seized in 1945 when everything was at a standstill and could not therefore hurt recovery. Also, it emphasizes that much of the Farben empire consisted of separate companies not closely integrated with the others.

BESIDES, the Army has already had a taste of moving too hastily. The steel producing plants within the Ruhr combine had at first been broken up into 25 or 30 units. Later, the military, British and American, learned the hard way that this was a serious mistake from the viewpoint of sound industry operations. It was necessary to recombine the properties into only a dozen units.

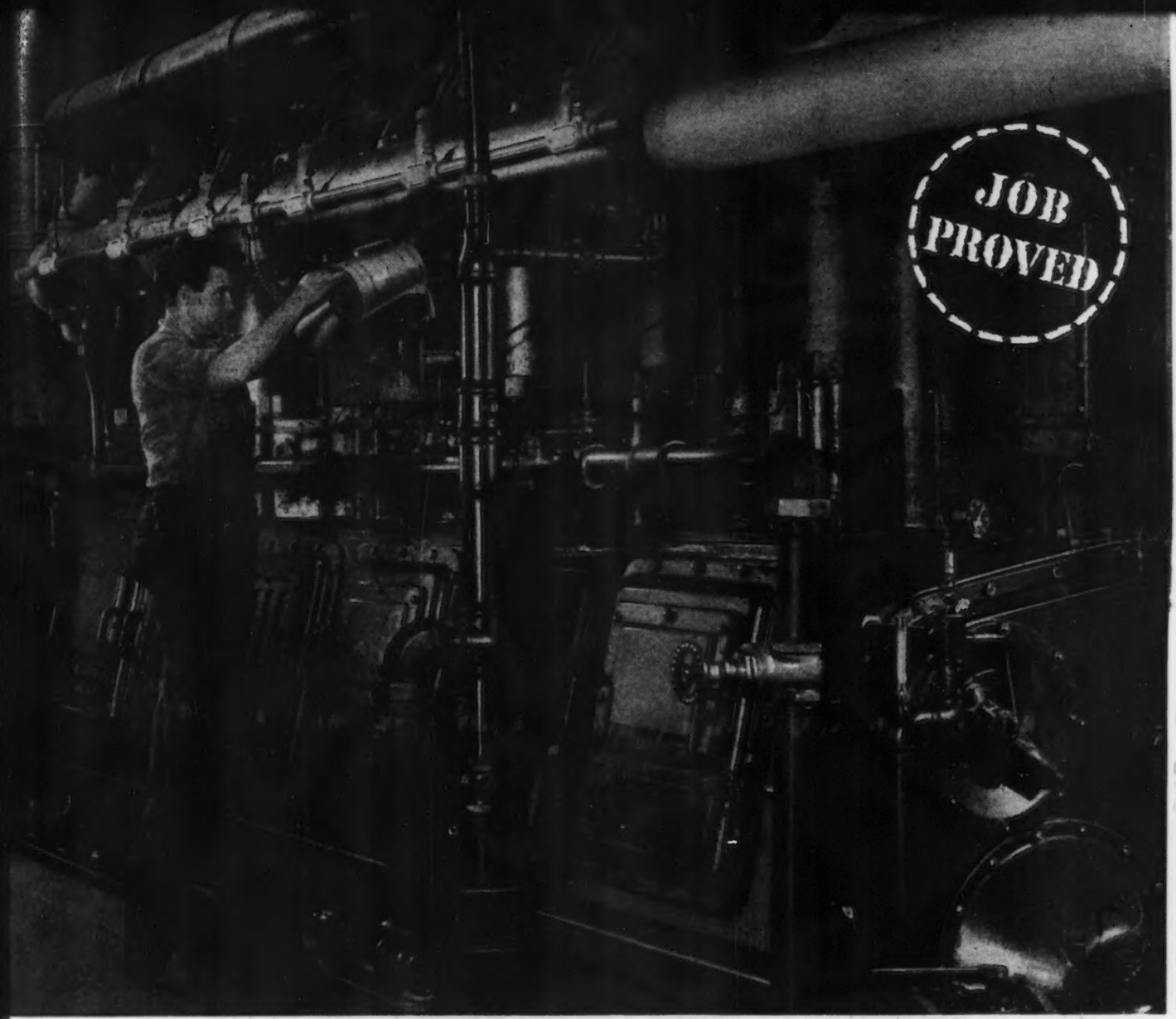
Despite differences of opinion in some respects, the Army generally agrees to most of the Ferguson committee recommendations. In general, these are:

That no major changes should be made in basic decartelization and deconcentration policy;

That the Ruhr steel industries should continue to be decentralized and at the proper time sold, but that the question of eventual ownership be left to an elected free German government;

That procedures should be simplified, though slowly;

That the staff should be strengthened under the civilian control setup (but holds that the Economic



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Results were impressive. Inspected after three months, the engine was found to be in the cleanest condition since installed. In tests run against competitive oils, one manufacturer's product sludged up in 600 hours. Yet the Sun oil was practically as good as new after 3,000 hours, showing but a slight increase in neutralization number. In further tests, the Sun oil ran 4,200 hours in six months' operation without a change; the engine remained clean and sludge-free, and showed no signs of wear.

On the basis of this performance, the plant has extended the use of Sun oil to other diesel units.

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and Deputy Economic Advisor and the Chief of Decartelization Branch should not be removed from responsibility but retained because of past experience);

That an educational program for the Germans showing the reasons for decartelization and deconcentration should be continued; and

That the program should be carried out on a case-by-case method rather than an overall program.

* * *

JOHN R. STEELMAN, adviser to the President and also, at present, acting chairman of the National Security Resources Board, moved last week to draw the line a little more clearly as to which agency is to do what in drawing up plans for mobilization for national defense.

The NSRB is responsible for blue-printing the master plan—for mobilization and conversion of industry, providing for sources and supply of manpower and materials, for setting up emergency agencies to control wartime economy. While all departments and agencies are to cooperate, jockeying for position is ruled out.

First of all, Dr. Steelman made clear, the military establishment will handle military matters. Through the Munitions Board, it will be held responsible for deciding what part civilians are to play in defending this country against attack. It will make the plans for such action.

This includes planning air-raid warning systems — involving the civil air patrol, plane-spotting and identification—as well as preparation for protective construction and other physical measures for defense. It will also decide to what extent civilians will take part in antiaircraft and harbor defense.

On the other hand, the Federal Works Agency will be the kingpin in working out a program for wartime "disaster relief." This means working out plans for the part both civilian and military groups are to take in repairing damages and injuries caused by a direct attack.

It involves planning for emergency hospitalization and medical facilities, fire fighting and protection, rescue and evacuation, measures for law and order including setting up of standards for conditions which would demand martial law, and a program for maintenance and repair of water, sewer, and utility systems.

In working out defense plans, Dr. Steelman named the Federal Security Agency, Atomic Energy Commission, and the Agriculture, Commerce, Interior, Treasury and Justice Depts. specifically to assist the board and two key agencies. Other agencies will be designated as needed.

All these agencies are to keep abreast of conditions and be able to provide up-to-date estimates of sources and quantities available of manpower, materials, services, facilities and other matters required to carry out the planning.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

HAVE HIM WAIT ON THOSE TILL I CALL HAP! HAVE HIM SET 'EM UP BUT WAIT! HAVE HIM GET TH' DETAIL DRAWING--
THAT'S WHAT THEY CALL ETHICS--YOU DON'T GO OVER THE FOREMAN'S HEAD!
I GUESS THE BULL OF THE WOODS MUST OF TOOK ONE OF 'EM TOO FAR ASIDE TO TELL HIM AN' TH' FOREMAN FORGOT WHAT HE WAS TO TELL TH' GUY BEFORE HE GOT TO HIM!
J.R.WILLIAMS
THE LIEUTENANT
7-8
T. M. REG. U. S. PAT. OFF. COPR. 1949 BY NEA SERVICE, INC.

Dollar Volume New Construction Expected To Exceed Estimates

Washington

• • • **Dollar value** of new construction to be put in place this year is now expected to exceed the government's first of the year estimates by $1 billion despite drops in some costs.

New construction may reach $19 billion or 1 pct above the revised figure of $18.8 billion for 1948, the Office of Domestic Commerce said last week. If costs continue to decline, the agency said, the percentage of physical completions might exceed those of dollar value.

As forecast by THE IRON AGE, there has been a swift rise in public construction. According to the OBC, it is now expected that the value of public construction will be a fourth more than last year. In value, this means that more than $5 billion will be expended in public money.

This is accounted for largely because of increased construction work in the field of hospitals and schools. State and local housing projects, extension of city sewer and water facilities, has been substantially increased as materials became more available.

Likewise, considerably more highway construction is expected for the year. Public utilities construction is still on the rise and indications are that this trend will continue through the year.

A continued decline in industrial building is expected to bring the 1949 total of 11 pct below last year's $1.4 billion. Stores, offices, garages and similar commercial construction will remain at last year's level of $325 million.

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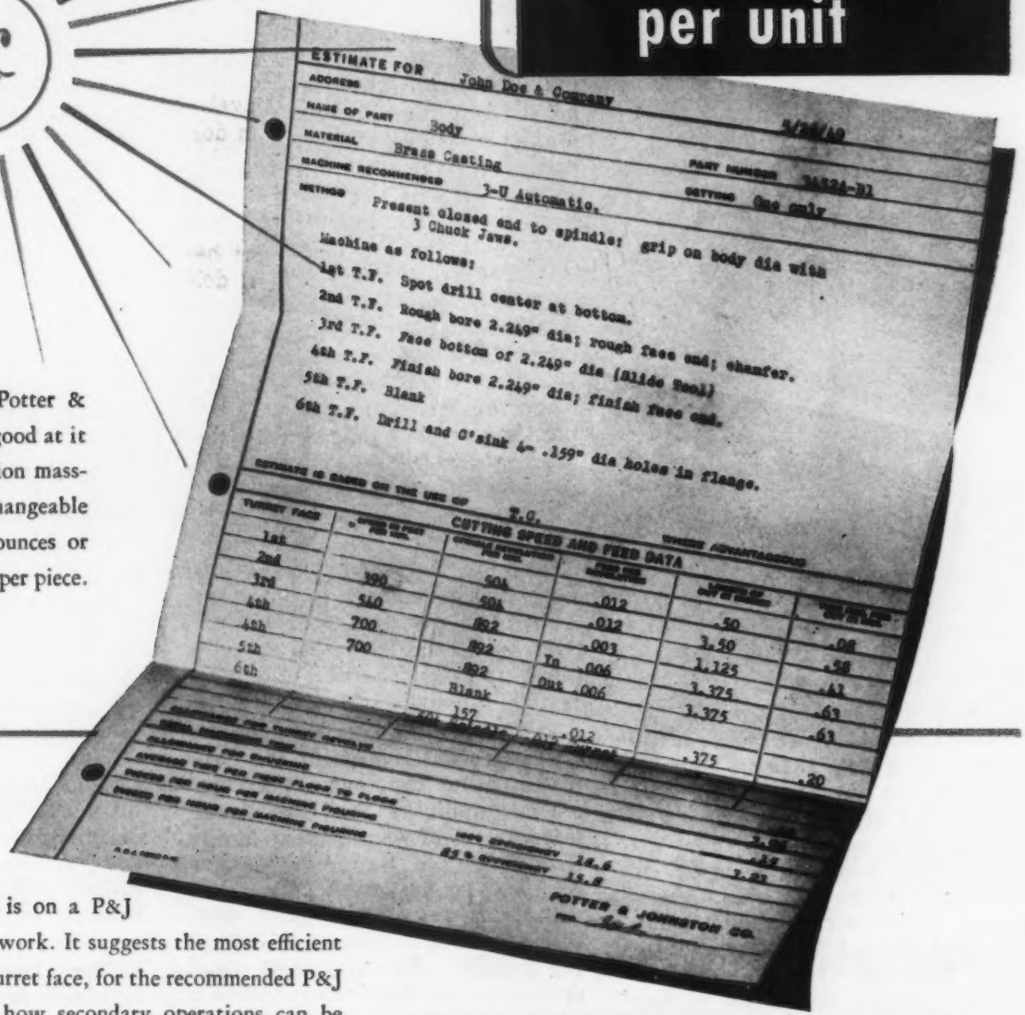
If there is one thing Potter & Johnston engineers are good at it is tooling up for precision mass-production of interchangeable parts, whether a few ounces or several hundred pounds per piece.


ESTIMATE FOR John Doe & Company

NAME OF PART Body

MATERIAL Brass Casting

MACHINE RECOMMENDED 3-U Automatic.

METHOD Present closed end to spindle; grip on body dia with 3 Chuck Jaws.

Machine as follows:

1st T.F. Spot drill center at bottom.

2nd T.F. Rough bore 2.249" dia; rough face end; chamfer.

3rd T.F. Face bottom of 2.249" dia (Slide Tool)

4th T.F. Finish bore 2.249" dia; finish face end.

5th T.F. Blank

6th T.F. Drill and C'sink 4- .159" dia holes in flange.

ESTIMATE IS BASED ON THE USE OF T.C.

CUTTING SPEED AND FEED DATA

TURRET FACE					
1st					
2nd					
3rd	390	50A	.012	.50	.08
4th	540	50A	.012	1.50	.58
4th	700	892	.003	1.125	.41
5th	700	892	To .006	1.375	.63
6th		892	Out .006	1.375	.63
		Blank			
		157	.012	.375	.20

Proof, if you want it, is on a P&J Estimate Sheet for *your* work. It suggests the most efficient tooling, turret face by turret face, for the recommended P&J Automatic. You'll see how secondary operations can be engineered into the main setup to reduce machining time . . . how unnecessary work-handling can be eliminated . . . how one man can operate two or more P&J Automatics, thereby gaining additional savings in divided labor costs. It forecasts the entire operation in actual cost-and-time figures.

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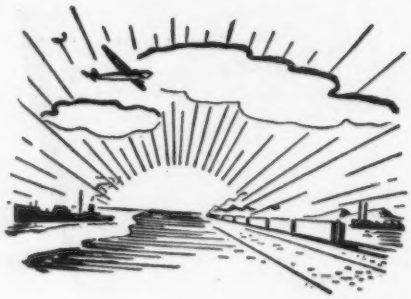
West Coast . . .

ROBERT T. REINHARDT

• Bay Area steel workers highest paid in California . . . Public works is important factor in steel market . . . Work stoppage at Columbia tin plate mill.



SAN FRANCISCO—Workers in the iron and steel industry in the nine counties surrounding San Francisco Bay are the highest paid in the state and among the highest in the country according to a survey just released by the Bay Area Council.

Average weekly earnings for the month of March 1949 in this industry in the Bay Area were $63.91 as against an average of $62.80 for the state as a whole. Los Angeles area paid an average of $61.85 per week. These totals represent weekly earnings of production and related workers and include overtime.

The average Bay Area worker receives a weekly pay check of $63.27 which is more than double the 1939 check of $30 and substantially greater than the average earnings of all California workers. Bay area manufacturing industries pay an average of $63.03 as compared with $61.09 average for all California factory workers and against the average of $60.64 in Los Angeles.

Steel workers are not among the highest wage earners in this area or in the state. Bay Area average for printing and publishing workers is $82.32 per week; petroleum workers, $74.25 per week; automobile and equipment workers, $66.67 per week; and chemical workers, $64.64 per week.

In evaluating the effect of the higher incomes of Bay Area production workers in the struggle for new industries the council points out that apparently the higher rates of pay have not kept manufacturers away. It is reported that in 1948 the Bay Area led Los Angeles in dollar value of new manufacturing facilities and in total expansions and new plants.

In 1948, however, Los Angeles was ahead of the Bay Area in dollar volume of expansion. This situation was reversed in 1947 when the Bay Area was ahead of Los Angeles in expansion but behind in new plants and total dollar investment.

In 1947 $98,320,978 were invested in new plants and expansions in the Bay Area and $124,811,000 were invested in the Los Angeles area. In 1948, $85,303,500 were invested in the Bay Area for new plants and expansions and $72,181,500 were invested in the Los Angeles area.

Most recent reports of the California State Employment Service officials indicate that the downward trend of employment in the San Francisco Bay Area earlier this year was reversed in May but manufacturing employment continues to drop in almost all industry groups. Reports from steel producers and fabricators indicate that no extensive layoffs have been necessitated as yet, although 4-day weeks are becoming necessary among some steel producers.

•

Public Works Provides Needed Steel Business

Los Angeles

• • • **Public works** by municipalities, the state and federal government is providing badly needed business for steel fabricators and foundrymen.

Highway building is drawing increased bids for all phases from bridge rails to the bridges themselves.

Many companies locally are participating in work on a 150,000 hp, $42 million electrical development of the Owens River by the Los Angeles Dept. of Water and Power.

When completed in 2 years, added protection to industrial power supplies will have been given. The development is in a 12-mile stretch of the Owens Valley on the central eastern slopes of the Sierra near the town of Bishop. The program will include 10 miles of giant tunnels cut through almost solid lava walls to provide 112,500 kw of electrical energy for Los Angeles. This, with additions by the Edison Co. in southern California, will be adequate for any emergency here it is believed.

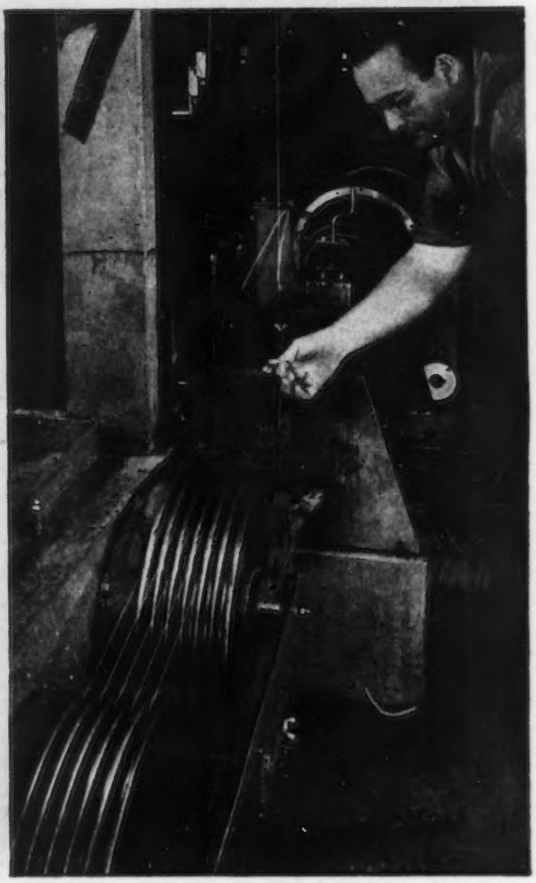
The construction operation, twice previously considered and rejected, now is made economically possible by the present cost of oil and the increased need for power. The engineering possibility of developing the power in Owens Gorge, due to the favorable drop in terrain, was discussed seriously in 1917 and again in 1922. The generation of power in steam plants then was cheaper than the cost of this hydro-electric project.

The tunnel contracts were awarded recently to a syndicate, known as Owens Tunnel Contractors, made up of four contractors, Bressi & Bevanda of North Hollywood, Guy F. Atkinson Co. of Long Beach, Teichert & Son of Sacramento and David Gordon of Denver. The tunnel cost is $8,947,520.

Consolidated-Western and Southwest Welding Co., both of the Los Angeles area, have developed into major contractors for penstocks for projects of this kind. Both companies are working on penstocks which will carry the water from dams to the power plants here. Southwest Welding is working at the same time on the fabri-

This photograph shows a 3⅛" diameter Monarch Whyte Strand Wire Rope coming off a Macwhyte closing machine. Weight of this rope is approximately 16.65 pounds per foot. It has a strength of approximately 392 tons and is used for the digging line on large dragline excavator with 35 cu. yd. bucket.

In this photograph is a 3/64" diameter Stainless Steel Cord coming off a Macwhyte closing machine. It weighs approximately 0.35 lbs. per 100 feet; has a strength of approximately 270 pounds, and is used for many small cord needs.



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You will get smoother operation and better service when you use the wire rope designed and manufactured to meet your requirements.

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Minneapolis • Fort Worth • Portland • Seattle
San Francisco • Los Angeles

Catalog on request.

cation of the penstock pipes for the Davis Dam.

The three tunnels are so planned that water drops about 750 ft through the penstocks to each power house.

Transmission lines and terminal facilities at North Hollywood call for an expenditure of about $13 million. The 230,000-v line will consist of cables more than an inch in diameter with a steel core and an aluminum outer casting.

Film Depicts Western Steel

San Francisco

• • • **Relationship between steel** production and other basic western industries is depicted in the industrial motion picture "Steel Builds the West" premiered last week by Bethlehem Pacific Coast Steel Corp.

This production was prepared primarily as a public relations project and will be shown to all employees and copies are available for use of civic groups, colleges, engineering and trade associations. In full color, the film runs slightly less than ½ hr and is well adapted to nontechnical groups. The greatest emphasis is placed on steel use in the growing industrial West with a minimum of steel producing operations shown.

Refrigerator Car Output

Seattle

• • • **Production of refrigerator** cars at Pacific Car & Foundry is well underway at the rate of approximately one car per hour during each working shift at their Renton, Wash. plant.

These latest contracts for refrigerator cars has increased employment from the high point of 650 during last winter up to 1500 at the present with more than 500 employed on the rail car line alone with the remainder working on production of logging winches, bulldozer blades and other logging machinery. The cars being produced for Northern Pacific Railway and for Western Fruit Express have steel sides, spun glass insulation and plywood interiors.

Spends $14.5 Million

Spokane

• • • **The Permanente Metals Corp.** spent more than $14.5 million in payrolls and purchases during the fiscal year ending May 31 at its aluminum reduction plant at Mead and its aluminum rolling mill at Trentwood, Wash. near here.

Approximately 3000 production workers for this company were granted a 5¢ per hr wage increase and other benefits last month through negotiations carried out by Charles J. Smith, CIO United Steel Workers of America district director, and Permanente officials. It is reported that this agreement is temporary and if negotiations now being carried out by the CIO with Aluminum Co. of America develop larger increases, they would then be accepted likewise by Permanente.

BLENDING IRON ORE: *A double carload of iron ore at a single sweep is poured by twin conveyor booms on blending stacks of Geneva Steel Co., Geneva, Utah. This is one of the first steps in the manufacture of steel for the West from western raw materials. Blending is performed to achieve maximum uniformity in physical and chemical composition, thus improving blast furnace operations.*

Work Stoppage on Tin Mill

San Francisco

• • • **Late last month** Columbia Steel Co. had added to the inherent shake-down difficulties of getting its complex electrolytic tinning line in operation, a work stoppage which was brought about when an operator refused to comply with a company directive relating to the line's operation.

Production from approximately seven shifts was lost when an operator refused to increase production line speed from 400 to 450 ft per min and was immediately suspended. As a result, it was necessary to shut down the equipment and send other members of the line's crew home. Operators coming to work on the 12 midnight to 8 a.m. shift likewise refused to operate the line on the new production schedule. The work stoppage began to spread to other departments in the sheet and tin mill.

O. L. Pringle, vice-president in charge of operations for Columbia, explained that the electrolytic tin line was placed in operation in the new sheet and tin mill in December and has been working at shake-down speed necessary in familiarizing the crews with its operations and making necessary adjustments. On return to work the crews operated the equipment at the increased speed specified and union officials will file a grievance according to contract. Eight employees per shift operate the electrolytic line on a three-shift day.

Metals Employment Down

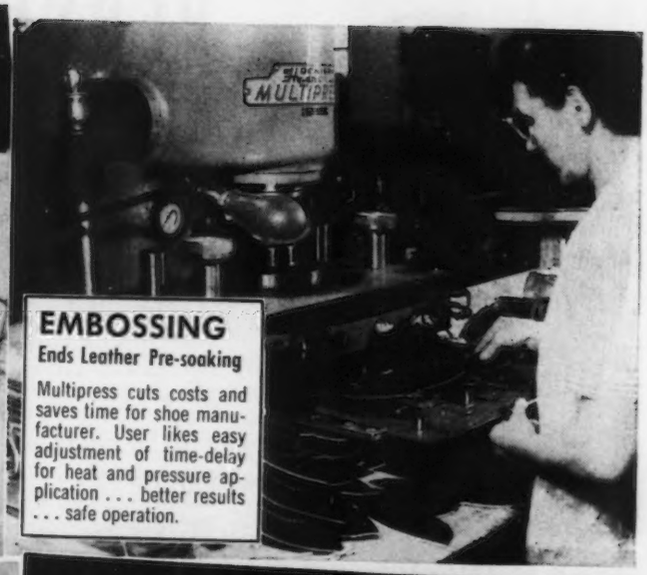
Seattle

• • • **Employment** in the metalworking industry, heretofore considered one of the most stable segments of Washington state's economy, has shown a weakness during the last few months.

Employment in the nonferrous metals industry was down 700 in May and in the ferrous metals industry there was a decrease of 200 in employment during that month. Ship repair employment was down 500 and aircraft was off nearly 1000 due to contract cancellations and another drop occurred in the machinery field. Only the fabricated metals division showed a slight gain in employment.

BLANKING
Ends Pile-up Damage

Automatic ram reversal at preset pressure limit prevents pile-up damage to parts or dies, in blanking parts for permanent wave machines. Fully adjustable ram stroke simplifies and speeds job change-over.



EMBOSSING
Ends Leather Pre-soaking

Multipress cuts costs and saves time for shoe manufacturer. User likes easy adjustment of time-delay for heat and pressure application . . . better results . . . safe operation.

TRIMMING
Die Wear Reduced

In removing flash from cast metal parts, Multipress user says pressure control is big aid to longer die life, fewer rejects. Operators remain seated, do more work, with less fatigue.

STAKING
Boosts Production 230%

Multipress speeds assembly of 4-part counter wheels for voting machines. Automatic indexing and smooth ram action meet need for high accuracy, cut scrap loss, increase safety.

Quality goes up, costs go down when you use MULTIPRESS

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equipped with indexing table, special tooling fixtures and hopper feeds, is used by one of the world's largest makers of electric appliances, for RIVETING silver contacts on brass and spring steel contact arms.

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You'll find many other proved ways to let Multipress boost production, cut costs, save time and improve quality on your own operations. Typical applications above are only a small part of the Multipress story. Other users tell of doubling and tripling production . . . cutting rejects to a fraction of the old rate . . . eliminating one or more complete operations . . . solving stubborn production problems, and so on. There are good reasons for this. In addition to basic advantages of oil-smooth, hydraulic action, Multipress offers other unique engineering features. Owners and operators *both* like its safer, simpler, easier, more accurate operation.

Multipress is available in a *complete* range of sizes and capacities from one to 35 tons. Widely interchangeable accessories, controls, and other features can be "tailor-made" to fit your requirements. Write for full information.

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See Multipress in action . . . how it works . . . how others use it!

PERSONALS

FRANK R. KOHNSTAMM, president, Jack & Heintz Precision Industries, Inc.

• **Frank R. Kohnstamm** has been elected president and chief executive officer of the Jack & Heintz Precision Industries, Inc., Cleveland, succeeding **Kenneth G. Donald,** who has become chairman of the board. **O. T. Hess,** secretary, has been elected a vice-president.

• **L. L. Lessig,** former contracting engineer, has been appointed contracting manager in the Philadelphia office of Bethlehem Steel Co., Bethlehem, succeeding **Frank U. Kennedy,** who has retired after 29 years as contracting manager for that company and the McClintock-Marshall Co., before the latter was acquired by Bethlehem.

• **Hubert C. Smith** has been appointed assistant vice-president in charge of metallurgical control, Great Lakes Steel Corp., Detroit. He had been chief engineer of the company since 1943.

• **J. Leo Cooke** has resigned as executive vice-president of Lehigh Warehouse & Transportation Co., Newark, N. J.

• **J. E. Brent,** general sales manager of International Business Machines Co., Ltd., of Canada, Toronto, has been elected vice-president of the company. Mr. Brent, who joined the Canadian IBM in 1931, had served on the company's sales staffs in several Canadian cities and in 1945 was placed in charge of all company sales.

• **Charles S. Conrad** has been appointed director of steel sales for Tay-Holbrook, Inc., San Francisco. Mr. Conrad, who had served the U. S. Steel Corp. since 1930, resigned recently from Columbia Steel Co. in San Francisco, where he had been manager of sales since 1947.

• **C. F. Johnson** has been appointed manager of valve sales, Manning, Maxwell & Moore, Inc., Bridgeport, Conn. Mr. Johnson has been associated with the company for the past year. He had previously been connected with Reed Roller Bit Co., Security Engineering Co. and Watson-Stillman Co.

• **Gen. Brehon B. Somervell** has been elected a director of the Carborundum Co., Niagara Falls, N. Y. General Somervell also serves as president of Koppers Co., Inc., Pittsburgh.

• **S. B. Withington,** general manager of the Lycoming and Spencer Heater plants of Avco Mfg. Corp., Williamsport, Pa., has been elected a vice-president of Avco.

• **William W. Hopwood** has been elected vice-president of the Hagan Corp., Pittsburgh. Mr. Hopwood has been associated with Hagan for many years. **William R. Kalbach** has assumed new duties in sales and service engineering in the Cincinnati office of Hagan. He had been in charge of service work in the New York district since 1946. He joined the company in 1940.

• **Edward H. Hart** has retired as export manager of the Stanley Works, New York. Mr. Hart has been with Stanley since 1897.

• **Don W. Williams,** who had formerly been manager of the Los Angeles branch of Pennsylvania Flexible Metallic Tubing Co., Philadelphia, has been transferred to Cleveland office where he serves in the same capacity. **C. F. Taylor** has been appointed to represent the company as the new branch manager in Los Angeles.

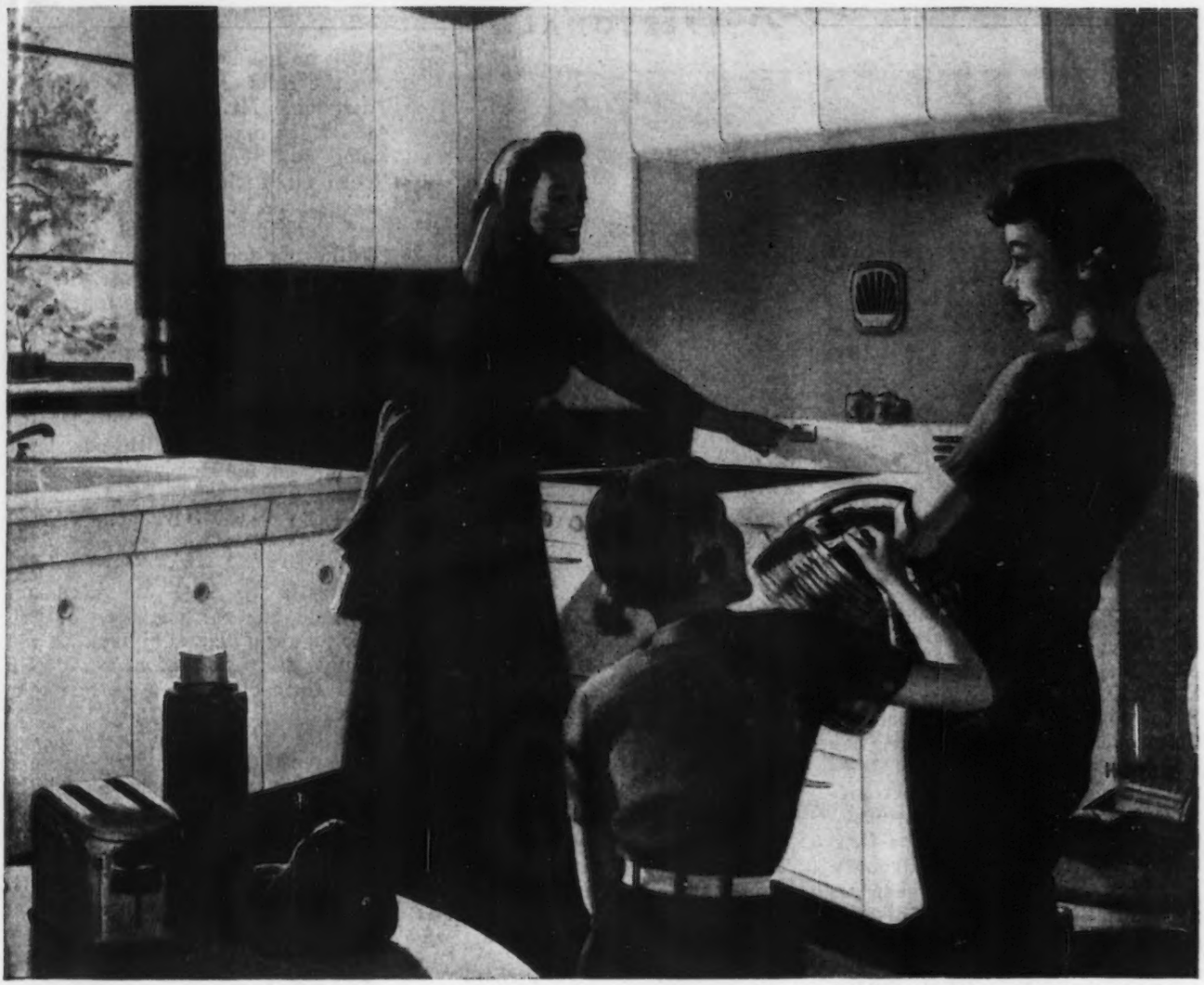
ARTHUR H. BUNKER, president, Climax Molybdenum Co.

• **Arthur H. Bunker** has been elected president of Climax Molybdenum Co., New York. Mr. Bunker had been a general partner in the firm of Lehman Bros. and was founder and first president of the U. S. Vanadium Corp. In addition to serving as a director of Climax Molybdenum, he also serves on the board of Firth Sterling Steel & Carbide Corp. and the American Metal Co., Ltd.

• **Sterling G. Maisch** has been appointed production manager of the axle division of Eaton Mfg. Co., Cleveland, succeeding **Charles H. Hunt,** who died. Mr. Maisch joined Eaton in 1943, serving in the production department. His previous connections had been in the production office of the West Steel Casting Co. and in the purchasing department of Standard Oil Co.

• **Franklin A. Ulrich** has been appointed controller of Fedders-Quigan Corp., Buffalo.

• **Thomas G. Eybye** has been appointed regional director for Latin America and the Orient and **Walter L. McKee,** regional director for Europe and the Middle and Near East. Ford International, Inc., New York. Mr. Eybye served for 22 years in General Motors overseas operations. Mr. McKee had formerly been associated with Remington Rand, Inc., as assistant European supervisor.



Mrs. Huguelet and twin daughters, as painted from photographs

Picnics are fun for the young in heart

Meet Mrs. Norbert Huguelet of 8320 South Marshfield Ave., Chicago, and her attractive 13-year-old twins, Patricia and Margaret. Of course Mrs. Huguelet is proud of them. And she is proud, too, of her new all-steel kitchen that lightens her housework and gives her much more time for her daughters.

Patricia and Margaret are housewives of tomorrow. They can look forward to pleasant, happy homelives of their own some day – easier even than Mother has now, and ever so much easier than Grandma had.

More practical, convenient kitchen equipment, better refrigerators and ranges, finer washing machines and irons – these and many other goods, all made of steel, are in use today throughout the country. Continuing research will assure more and more advances for tomorrow.

The 1500 pounds of steel in Mrs. Huguelet's compact kitchen might have come from any of two score or more steel companies among the 247 which compete to make the best quality steel, at the lowest possible price.

When you get right down to it, the many conveniences in their home are the reasons why the Huguelets have more time for picnics and play. That is why Patricia and Margaret will have more time for good living tomorrow. That is why and how steel and the American system serve the people.

Steel works for EVERYONE

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C. HIX JONES (left, see THE IRON AGE, June 23, p. 102) and D. L. MARKLE, JR. (right), district sales managers, Youngstown Sheet & Tube Co.

• **Clinton J. Forstrom, Robert W. Johnson, Eugene D. Britt, Jr., Leo J. Halkovich** and **John F. Myles** have been appointed district representatives for the construction materials department of the General Electric Co., Bridgeport, Conn. Mr. Forstrom has been assigned to the north central district with headquarters at Fargo, N. D. Mr. Johnson serves the wholesale trading area of New Haven, Waterbury and Hartford, Conn., with headquarters at New Haven. Mr. Britt serves the Syracuse and Elmira, N. Y. areas with headquarters in Syracuse. Mr. Halkovich covers the Johnstown and Altoona, Pa., territory with headquarters in Johnstown. Mr. Myles covers the southeastern district with headquarters in Jacksonville, Fla.

• **Charles M. Hollis,** assistant controller of Kaiser-Frazer Corp., Willow Run, Mich., since 1947, has been appointed controller of the corporation.

• **H. D. Wright** has been appointed director of sales, western region, Industrial Brownhoist Corp., Bay City, Mich., with headquarters in San Francisco.

• **Jack Stout** has been appointed district manager of the new West Coast office at Oakland, Calif., of the H. M. Harper Co., of Chicago.

• **D. L. Markle, Jr.** has been appointed district sales manager in charge of the New Orleans office of the Youngstown Sheet & Tube Co., Youngstown, succeeding Orville B. Ewing, who died. Mr. Markle has been with the company nearly 11 years, serving as a salesman in the Dallas and New Orleans areas.

• **Herbert F. Weaver,** manager of forging sales, Bethlehem Steel Co., Inc., Bethlehem, since 1944, has retired. He had been with the company since 1901 when he joined the firm as a stenographer and clerk in the purchasing department. **George E. Warren,** engineer and **Charles P. Xander,** clerk, forgings and castings sales, have also retired. Mr. Warren joined Bethlehem in 1924 and has been an engineer in forgings and castings sales since 1946. Mr. Xander has been with the company since 1923. **John M. Donovan, Henry Thomas** and **Frank C. Mumbauer** of rails and track accessories sales and **William Ditlow,** fabricated steel construction sales, have also retired. Mr. Donovan joined Pennsylvania Steel Co. in 1901, and when that company was acquired by Bethlehem in 1916, he became division head in the order department. Since 1938 Mr. Donovan has been division head in the sales department. Mr. Thomas joined Bethlehem in 1924 as an engineer in the sales department. Since 1940 he has served as a salesman in the rails and track accessories division. Mr. Mumbauer joined the sales department of the company in 1917 and since 1937 has been chief clerk, rails and track accessories sales. Mr. Ditlow joined Pennsylvania Steel in 1901. Following acquisition of that company by Bethlehem, Mr. Ditlow was employed in the fabricated steel construction department and for the past year has served in fabricated steel construction sales.

• **E. Palmer Meredith** has been appointed district sales engineer working out of Chicago for the V & O Press Co., Hudson, N. Y.

• **Martin F. Shea** has been appointed general manager of the car manufacturers' division of the Philco Corp., Trenton, N. J. He had formerly served as manager of the division.

• **E. D. Longenecker** has been made national service manager for the Lincoln-Mercury division of Ford Motor Co., Dearborn. Mr. Longenecker replaces **G. H. Schricker** who has been appointed to work on special assignments in the field sales organization. **Ray P. Powers** has been named manager of quality control of the Lincoln-Mercury division. Mr. Powers is a veteran of 25 years with the automobile business and had previously been engaged in private enterprise at Manitowoc, Wis.

• **E. W. Pat Smith** has been appointed director of merchandising of Owens-Corning Fiberglas Corp., Toledo. Mr. Smith, who joined the Fiberglas Corp. earlier this year as special assistant to the general sales manager, had formerly been vice-president for sales of the Philip Carey Mfg. Co. **Tyler S. Rogers** is technical editor and manager of Fiberglas Standards publications. **Stephen J. Daly** is advertising manager of the General Products division. **Philip Linne** is in charge of Fiberglas displays and exhibits. **Edward C. Ames,** who has been director of advertising on an interim basis for two years, has been appointed director of public relations and publicity.

• **Robert B. Semple,** general development director of Monsanto Chemical Co., has been elected president of Wyandotte Chemicals Corp., Wyandotte, Mich., succeeding **E. M. Ford** who relinquishes that post on Sept. 1 to become chairman of the board of directors.

• **Edward J. Fortman** has been appointed zone merchandising manager for southern California and southern Nevada for the Hudson Sales Corp.

• **Kenneth F. Brooks** has been appointed plant engineer of the El Segundo, Calif., plant of Nash-Kelvinator Corp., Detroit.

• **Alfred J. Kroog** has been appointed sales representative for the state of Georgia, Electric Machinery Mfg. Co., with headquarters in Decatur (Atlanta).

• **W. G. Twyman,** production manager of the A. P. Green Brick Co., Mexico, Mo., has been transferred to Detroit to become general manager of A. P. Green Fire Brick Co. of Michigan, a subsidiary selling company, covering the state of Michigan. **W. F. Mundy,** who has been plant superintendent in Mexico since 1947, replaces Mr. Twyman as production manager. Mr. Twyman joined the company in 1936 and Mr. Mundy in 1926.

• **Clarence M. Strong** has been appointed director of purchases of Gar Wood Industries, Inc., Wayne, Mich. Mr. Strong recently resigned as director of purchases of F. L. Jacobs Co.

• **O. E. Isenburg** has been appointed new field sales manager of plastic materials for the B. F. Goodrich Chemical Co., Cleveland. He has been associated with the company in various technical and sales positions connected with plastic materials for the past eight years. **E. B. Osborne** has been appointed sales representative for Geon materials. Mr. Osborne joined the B. F. Goodrich Co. in 1943 and for the past six years has been engaged in research and technical service work. His territory includes Philadelphia and certain sections of Delaware and Maryland.

HENRY V. BOOTES, vice-president, American Car & Foundry Co.

• **Henry V. Bootes,** formerly assistant vice-president, has been elected vice-president in the sales department of the American Car & Foundry Co., New York. He continues to make New York his headquarters. Mr. Bootes joined ACF in 1947 and had previously been district manager of the Ohio Injector Co.

• **Gordon A. Roth** has been appointed assistant treasurer of Willys-Overland Motors, Toledo. Since 1941 Mr. Roth has been affiliated with Konopak & Dalton, and since 1944 has been in charge of the complete audit of Willys-Overland. **Mark A. Howard** has been named business management manager of the Willys sales department. Mr. Howard has served in various business management capacities with Nash Motors and Chevrolet Motors. **C. Coyle Smith** has been named manager of the project planning and research department of Willys-Overland. Mr. Smith has been in the automotive industry 15 years, joining the company's administrative planning staff in 1946. **Robert M. Palmer** has been named truck and equipment sales manager for the company succeeding **A. T. Gardiner, Jr.,** who resigned. Mr. Palmer formerly had been in charge of the sales engineering staff of Reo Motors, Inc., and had been associated with Chevrolet and General Motors fleet division in sales engineering work.

J. L. McDERMOTT, manager, Ryertex Div., Joseph T. Ryerson & Son, Inc.

• **J. L. McDermott** has been named manager of the Ryertex division of Joseph T. Ryerson & Son, Inc., Chicago, succeeding **Kenneth T. MacGill** who has retired after 32 years of service with the company. Mr. McDermott, who previously served as western sales manager of that division, has been with Ryerson since 1923, serving as sales representative in Cleveland and Pittsburgh, prior to taking up headquarters in Chicago last year.

• **W. M. Walker** has been appointed district manager in the Cleveland area for the Torrington Co., Torrington, Conn., and South Bend, Ind. **J. N. Wholean** has been transferred from the Milwaukee office to the Cleveland office as district engineer and **R. U. Sautter** has been transferred from the engineering department of the Bantam Bearing division of the company at South Bend to the Milwaukee office as district engineer.

• **E. Wolfert** has been appointed manager of engineering at Seeger Refrigerator Corp., Evansville, Ind.

• **Harold H. Solof** has been named general sales manager of Tracy Mfg. Co., Pittsburgh. This new position comes as a promotion, he having previously served as sales manager, National Accounts division of the company.

E. F. ALLISON, field sales and service manager, Fansteel Metallurgical Corp.

• **E. F. Allison** has been appointed field sales and service manager, Fansteel Metallurgical Corp., North Chicago, Ill. Mr. Allison divides his time between the general office at North Chicago and branch offices throughout the country. He had previously been stationed at Cleveland and served as district manager of the Ohio, western Pennsylvania and western New York sales area.

• **Grant E. Scott, Jr.,** has been appointed assistant sales manager, Klipfel Valves, Inc., a division of Hamilton-Thomas Corp., Hamilton, Ohio. Mr. Scott had formerly served with Wright Aeronautical Corp. as test engineer and with Allis-Chalmers Mfg. Co. as field and sales engineer.

• **Frank M. Goodman** has been appointed sales promotion manager of the industrial division of Lincoln Engineering Co., St. Louis. Mr. Goodman had previously served 16 years with Skilsaw, Inc., selling in the Pittsburgh area, managing the Cleveland office and later as eastern sales manager.

• **Howard Peters** has been appointed project engineer for the Rollpin division of Elastic Stop Nut Corp. of America, Union, N. J. Mr. Peters had formerly been a vice-president of Mid-Continent Metal Products Co., Chicago.

J. M. DAVIES, director of research, Caterpillar Tractor Co.

• **J. M. Davies** has been appointed director of research of Caterpillar Tractor Co., Peoria, Ill., succeeding **C. G. A. Rosen,** who now devotes his time, in an advisory capacity, to the further development of diesel engine design and performance and assists in the company's technical program. Mr. Davies has been with the company since 1929. In 1945 he became associate director of research and is succeeded in that position by **Dr. L. A. Blanc,** who had previously served as assistant director of research.

OBITUARY...

• **Irving H. Jones,** 67, who had been associated with Pittsburgh Crucible Steel Co., Molybdenum Corp. of America, Allegheny Ludlum Steel Corp., and others, died June 17.

• **Lloyd E. Van Epps,** 66, superintendent, Buffalo Pressed Steel Co. died in Youngstown, Ohio, June 24.

• **Carl M. Ott,** supervisor of employment, Youngstown Sheet & Tube Co., Youngstown, died June 26.

• **John P. Hilands,** general manager, sales, Tube Reducing Corp., Wallington, N. J. died June 18.

• **Sidney G. deKay,** 68, vice-president and director, Olin Industries, Inc., New York, died June 21.

• **Edward C. Greenstreet,** eastern district manager for Chicago Vitreous Enamel Product Co., Cicero, Ill., died June 15.

• **B. F. Darbyshire,** president, Darbyshire Steel Co., El Paso, Texas, died June 5.

• **Ralph G. Mansfield,** 65, one of the foremost designers of electric arc furnaces, who retired in 1948 after 36 years' service with the Electro Metallurgical division, Union Carbide & Carbon Corp., Niagara Falls, N. Y., died June 19.

• **John R. Forbes,** 75, head of John R. Forbes Foundry & Iron Works, Jersey City, and president of the Grate Bar Co., New York, died recently.

• **Ivan L. Nixon,** 65, vice-president in charge of the scientific instrument department, Bausch & Lomb Optical Co., Rochester, N. Y., died June 25.

• **Elias A. C. Smith,** 76, for many years a partner in the firm of Guggenheim Bros., New York, and an inventor of several scientific processes contributing to the commercial development of rarer elements, died June 25.

• **William H. Fricker,** 58, general sales manager of M. D. Knowlton Co., Rochester, N. Y., died recently.

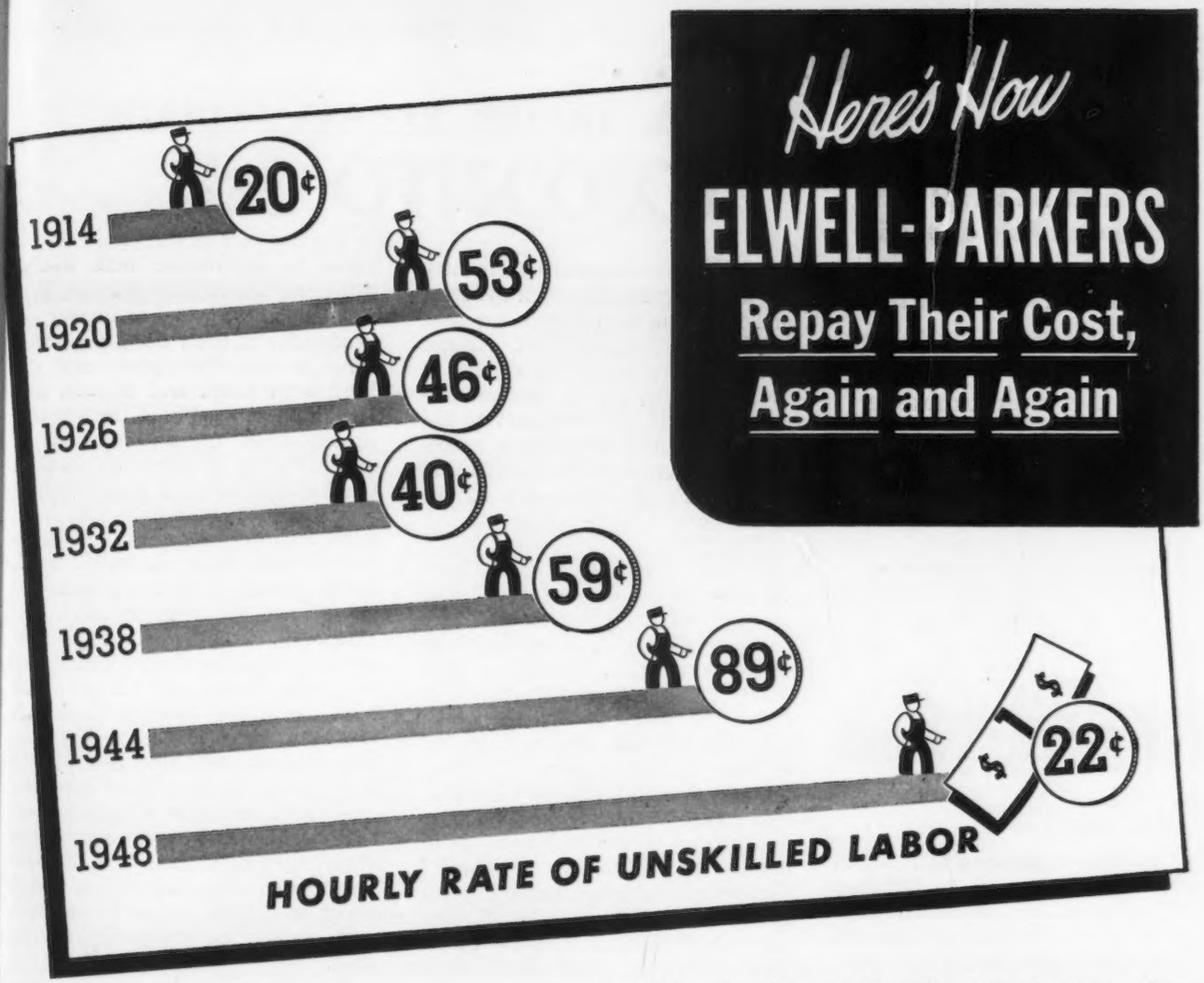
• **Charles A. Roebuck,** 59, eastern industrial sales manager, Pittsburgh Plate Glass Co., died in South Orange, N. J., June 27.

• **L. E. Gaines,** 82, president, Dexter Washing Machine Co., Fairfield, Iowa, died June 27.

• **Dr. Harry M. Goodwin,** 80, dean emeritus, Massachusetts Institute of Technology, died June 26.

• **Sheldon A. Modglin,** 54, chief construction engineer, Morrison-Knudsen Corp., San Francisco, died June 18.

• **Tom Lee Ball,** mine safety administrator for the State of Alabama, died June 24.



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E-P Trucks do more than just surpass manual labor on the basis of operating costs. They also give these plus values:

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Since Elwell-Parkers are a *better buy than ever before,* you will profit by having an EP man advise you *now* about your trucking needs. The Elwell-Parker Electric Company, 4225 St. Clair Avenue, Cleveland 3, Ohio.

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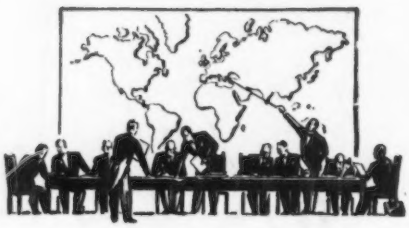
POWER INDUSTRIAL TRUCKS
Established 1893

European Letter . . .

• Restoration of stability and security in southeast Asia depends on successful negotiations between Dutch and Indonesian Republicans . . . Former will gain by magnaminous policy of concessions to Indonesian leaders.



LONDON—Prolonged delay has for so long come to be taken for granted in everything connected with Indonesia that little interest is now aroused by any news of negotiations between the Dutch and the Republicans for settlement in a country which has had no peace since the Japanese descended on it from the north at the end of 1941. Yet among the problems which beset the statesmen of the non-Communist world there is none more important than that of restoring stability and security to southeast Asia, and within that region Indonesia is the largest single unit both in area and population. To the west it almost envelops Malaya across narrow seas; to the northeast it adjoins the Philippines, which are still under the protection of the United States and the main base of American power in the western Pacific; and to the southeast it approaches the nearest of Asiatic countries to the northern territories of Australia. Its present distressful state is thus of close concern both to the United States, Britain and the Pacific members of the Commonwealth as well as to the Netherlands. Further, it is an object of great political interest for two powers not immediately adjacent to it: for the Soviet Union, because it affords a most hopeful opportunity for attacking capitalism in the rear, and for India as a sphere for that alternative leadership of Asiatic nationalism which India aspires to give. Finally, the Indonesian dispute has been made subject to the resolutions and conciliation procedures of the Security Council and is thus officially a concern of the whole world.

IN the four years that have passed since Japan surrendered, the problem of Indonesia's future has defied solution either by force or by negotiation. There has been plenty of fighting and bloodshed in Indonesia, and the violence which has taken place has exacerbated feelings on both sides; yet it may be said that the difficulty of solution has been due not so much to warfare as to the endeavors from outside to bring about a peaceful settlement without agreed principles on which to base it. Fundamentally the conflict is one between legal rights of sovereignty combined with superior force on the one hand and the principle of national self-determination on the other. The Dutch have claimed as an internal affair of the Netherlands action taken against forces in revolt against their sovereignty, a sovereignty never formally repudiated by any of the nations on the Security Council, which have nevertheless applied to the conflict between the Dutch and Indonesian rebels procedures framed by the Charter only for disputes between recognized states. It is the intervention from outside which has given so much moral strength to the Republic, but has at the same time produced in the Dutch, or at least in those who were until recently in control of Dutch policy, a bitter sense of grievance not conducive to success in any negotiation.

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On the other hand the western nations which have tried to stop the Dutch police measures — and their number includes first and foremost the United States—have acted in accordance with liberal principles which they not only profess but have applied to former dependencies of their own, the Americans in the Philippines and the British in India and Burma, and also in apprehension at the possible consequences of a situation in which Europe might be faced with the hostility not only of the Soviet power but of all Asia. The independent Asiatic nations, headed by India, have been animated by a lively sympathy for the Indonesian cause, fed by fresh memories of their own struggles for emancipation. Lastly, the Soviet Union and the other Communist states which have taken sides against the Dutch have also acted in accordance with the principles and sentiments proper to their ideology, but with the overriding purpose of using colonial revolt as a weapon against the West; they have, therefore, not desired any compromise settlement which would put an end to warfare and restore the prosperity of the area.

A state which has legal sovereignty over a territory can retain it unless it either cedes it voluntarily or is evicted by force. As the Indonesian Republicans are not strong enough to drive out the Dutch by force, although they can make occupation costly for the Dutch by guerilla warfare, and as the UN Security Council has no means of imposing any settlement by direct coercion, it follows that an independent Indonesia cannot be brought into being without the consent of the Dutch, and that consent must be sought by persuasion. The task of those who would promote a settlement must be neither to threaten nor to preach sermons, but to put it to the Dutch by rational argument that they have more to gain than to lose by a magnanimous policy of concessions to the Republic, a policy which they are actually in a better position to pursue since their capture of Jogjakarta has demonstrated their military capacity, so that it will be clear that whatever they yield is given from strength and not from weakness.

(CONTINUED ON PAGE 157)

MECHANICAL HANDLING SYSTEMS, INC.

REDUCES TRAILER WEIGHT 22%

with J&L OTISCOLOY

HI-TENSILE STEEL SHEETS

J&L STEEL

Automobile-transport trailer under construction at Mechanical Handling Systems, Inc., Detroit, Mich. The J&L OTISCOLOY high-strength steel-sheet parts are easily formed and joined.

The high-strength steel trailer ready to get underway. Each automobile is safely cradled on OTISCOLOY sheet-steel tracks.

High-strength steel cuts ton-mile costs for operators of huge automobile transport trailers.

Maximum structural strength, rigidity and fatigue resistance are essential in huge automobile carrier trailers like those built by Mechanical Handling Systems, Inc., of Detroit, Mich. But these characteristics must be obtained with the very minimum of dead weight. Therefore high-strength steel is used almost entirely.

In the trailer illustrated, the use of J&L OTISCOLOY sheet helps to reduce dead weight from 9,000 lbs. to 7,000 lbs.—*a saving of 1 TON, or 22%!*

In many structures, the use of J&L OTISCOLOY reduces dead weight *as much as 35%* without loss of strength, because:

J&L OTISCOLOY

—Has twice the yield strength of mild steel

—Has 50% greater fatigue resistance than carbon steel

—Is resistant to abrasion

—Resists atmospheric corrosion 6 times better than carbon steel

J&L OTISCOLOY can be worked by any standard metal-working method . . . formed hot or cold . . . welded . . . flame-cut. Its ability to hold paint and resist corrosion further widens its applications.

Let us send you a copy of: "OTISCOLOY High-Tensile Steel." Mail the coupon today.

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

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Jones & Laughlin Steel Corporation
403 Jones & Laughlin Building
Pittsburgh 19, Pa.

Please send me at once a copy of your booklet: "OTISCOLOY High-Tensile Steel."

NAME_____

COMPANY_____

ADDRESS_____

• **DECENTRALIZATION**—During the next few months, Kaiser-Frazer will begin operations at its first small, experimental plant at Long Beach, Calif. The plant is tooled to produce about 20 cars per day. A similar plant is planned for Portland, Ore. Others may be built if present experiments prove successful, according to Edgar Kaiser, president. Another K-F spokesman denied a press report that the company might build as many as 1000 small, final assembly plants throughout the country.

• **PIG IRON**—It was disclosed that Pittsburgh Coke & Chemical Co. will furnish General Motors Corp. with pig iron from its Neville Island plant. Originally this pig iron was to come from Struthers Iron & Steel Co., Struthers, Ohio, a subsidiary company. Changing the producing point of pig iron to Neville Island will save the Pittsburgh concern about $2.50 per ton freight charges on coke, according to company officials.

• **BOOSTING OUTPUT**—Production on the No. 2 seamless tube mill at the McKeesport plant of National Tube Co. is scheduled to be stepped up on July 10 from the present 6-day week to a 7-day week basis, three turns a day. This will return the mill to the wartime production rate. While seamless tube demand remains strong, declines in other products permit channeling more steel to the tube mill.

• **STRUCTURAL BOOKINGS UP**—The American Institute of Steel Construction, Inc., estimated that the total bookings of fabricated structural steel for May was 17.5 pct over bookings for the preceding month. Shipments for May totaled 167,976 tons. The 5 month total for 1949 is 831,542 tons as compared with 808,550 tons for the same months of 1948.

• **EARNINGS UP**—Because of a slightly longer workweek, average weekly earnings of factory workers in May stood at $53.08 as against $52.70 in April, according to the Bureau of Labor Statistics. However, because of a lowered production rate, steelworkers saw their average weekly worktime drop by a quarter-hour and their weekly pay envelope decrease from April's $58.56 to $57.99 in May.

• **GEARS SLIP**—Volume for the gearing industry in May decreased 26.2 pct from April of this year, according to the American Gear Manufacturers Assn. The index figure for May is 250.1 (1935-39 equals 100).

• **PENNSYLVANIA BUSINESS OFF**—Pennsylvania industrial activity declined in May for the fourth consecutive month and reached the lowest level for the period since 1946. The Bureau of Business Research of Pennsylvania State College reported last week that the state's industrial activity index fell to 177, or 9 pct under May 1948. Building contracts in May were the highest since such records were first kept in 1936. Industrial power sales were the second best on record.

• **HAND MILL CLOSEDOWN**—The Superior Sheet Steel plant at Canton, Ohio, one of the few remaining hand sheet mills, has been closed down by Borg Warner Corp. who bought the plant to supply sheets during the steel shortage. The mill is reported by officials to have operated for years on a very close margin and would not be able to compete with the wide strip mills in an easy steel market.

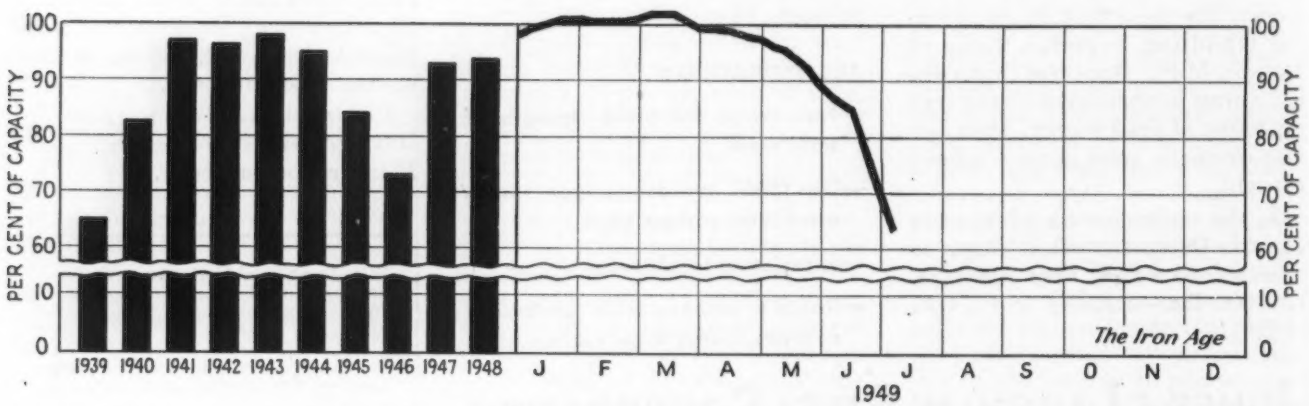
• **DELAY NATIONALIZATION**—Nationalization of the steel industry in Britain has been delayed until after the general elections due next year. This was brought about by a series of amendments to the bill by the House of Lords. The labor government will not accept the amendments. The House of Lords hold that the government has no mandate to nationalize steel.

• **VACATION CLOSEDOWN**—The West Leechburg, Pa. plant of Allegheny Ludlum Steel Corp. will be closed from July 2 to July 11 while workers are on vacation. The plant, a finishing steel mill employs about 1800 persons. American Steel & Wire Co.'s Rankin plant will be down for 2 weeks. Many others have reported shutdowns of from 1 to 3 days.

• **RESUME LABOR TALKS**—Labor contract talks between the United Steelworkers of America CIO and U. S. Steel Corp. of Delaware are slated to be resumed in Pittsburgh July 6. In a letter to Philip Murray, president of the Steelworkers Union, John A. Stephens, vice-president of industrial relations of the corporation, said suggestion of the date was "consistent with the company's expressed intent to be as expeditious in their review as may be possible."

• **BUILDERS BUSY**—With building forecasts revised upward over January estimates, Dept. of Labor now predicts construction employment will rise to 2,333,000 by mid-August. This would be an increase of about 80,000 over the 1948 peak and 300,000 above forecasts earlier this year. About a third of the total will be engaged in building homes or housing.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
June 28	78.5*	93.0	75.5*	82.0	84.0*	62.0*	78.0	101.0	82.0	85.0	69.0	81.0	62.0	80.0
July 5	58.5	68.5	42.0	70.5	58.0	62.5	74.0	103.0	66.0	80.5	47.0	65.0	50.0	63.5

* Revised.

Industrial News Summary

- ***Steel Industry Back To "Normal"***
- ***Correction Is A Necessary Evil***
- ***Most Buyers Can Wait For Cuts***

THE steel industry this week is back to "normal" with more than a bang. It is suffering from: (1) Holiday influences; (2) mass vacations; (3) falling off in orders and (4) a general "show me" attitude by buyers. Just how much it will recover in the next several weeks remains to be seen. The ingot rate will advance again next week but the general downtrend is by no means ended.

Because of holiday and other factors the steel ingot production rate this week is off 16½ points to 63.5 pct, the lowest rate in years, barring periods when there were strikes. There is no chance that any real strength will come into the operating rate—much if any before September.

Yet the sharp drop in steel mill activity has its good points as well as its bad ones: (1) Steel has to go through the same stage as other industries; (2) the inflationary heights were by no means normal in any sense; (3) unbalanced inventories must be cut down before any long term general business level can set in and (4) it will put all steel people in the mood for better products, to put more emphasis on selling and stimulate competition.

There are plenty of factors this week which are expected to put the needle into steel sales departments—and production departments for that matter. New business is not good. Backlogs are dwindling rapidly—where they are not already gone. Customers are getting fussy and are in the saddle—where they intend to stay. And the price situation is by no means as simple as it looks.

THE steel customer keeps hammering at prices. Though he knows all the reasons for higher costs he is paying little attention to them —he is being badgered on his side on his prices. But it was still clear this week that there are no major steel price changes in the offing for the near future. The steel ingot rate might take care of that picture before any steel firms get into a "willing" position. Yet there were no signs and no evidence this week that the price structure was weakening. It was as strong as ever.

It has also become clear that most steel buyers outside of the automobile industry haven't a thing to lose by waiting for lower steel prices. A spot check just completed shows that steel stocks in fabricators' hands will last them twice as long today as they would 2 months ago. This is because their business has declined and stretched out the relative size of their inventories. Any definite upturn in business would naturally change this condition.

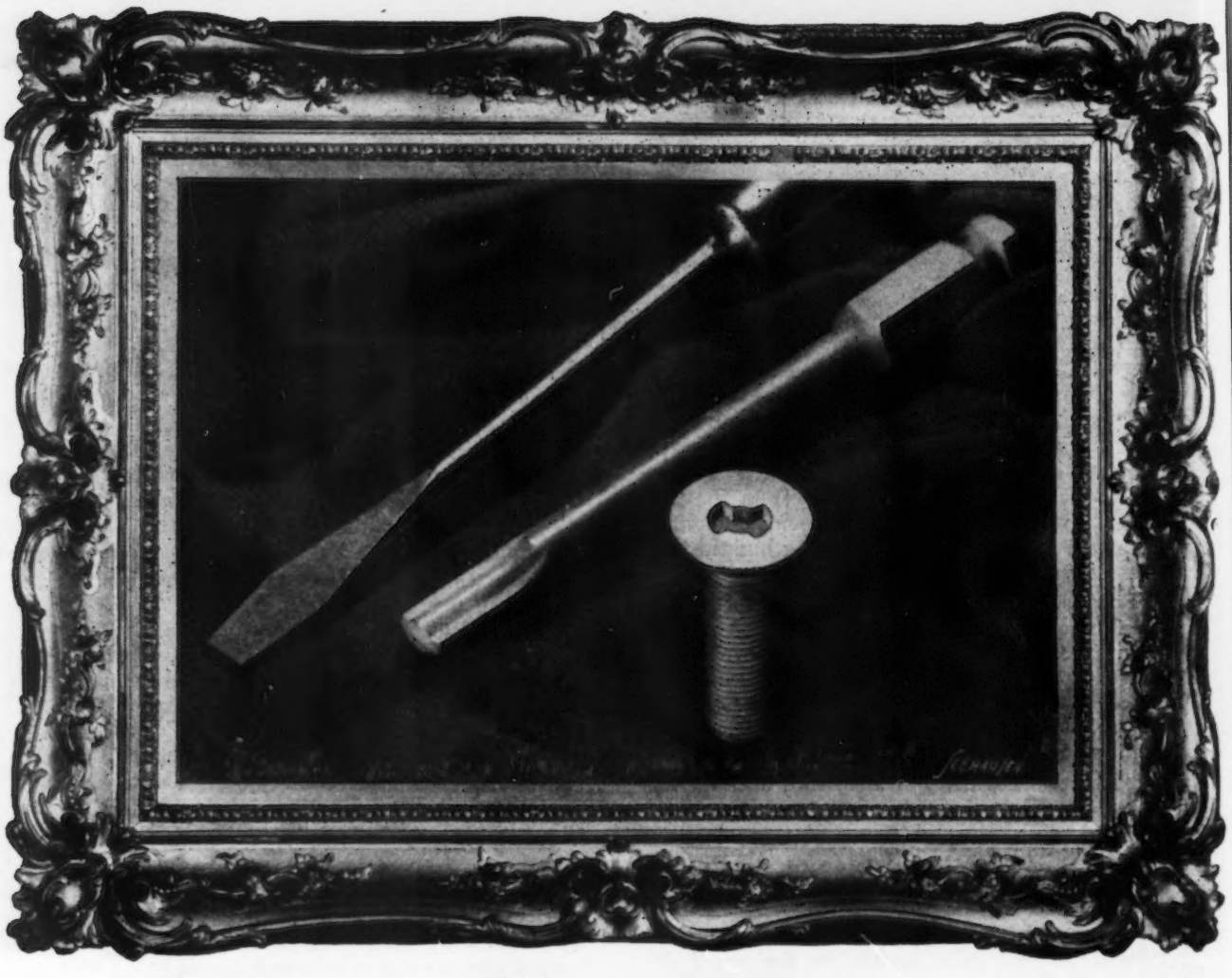
On the basis of orders coming into steel mills it hardly seems likely that the operating rate for July and August will do anything but decline. And there is reason to expect that it might go to 65 pct or lower. This will not mean that things are going to pieces in a wheelbarrow.

There were many times in the past when the steel rate fluctuated between 60 and 80 pct of capacity without the use of wailing walls or tear towels. Today's capacity is at a much higher figure than it was before the war. The operating rate may be the same but the tonnage of steel being rolled out is much greater. Generally, sales people in steel look for a slight pickup in the fall—purely seasonal. Many of them look for a real pickup and a general end of the housecleaning some time next year.

FOR many reasons, including higher costs, steel companies don't want to have to operate their coal mines only 3 days a week. But even if they do run at this rate it will be months before it would affect steelmaking operations. Coal stocks on hand at most mills now will last for 2 months even if steel operations could somehow be pushed to 80 pct of capacity. If captive mines worked 3 days a week most steel mills could operate without a hitch into the late fall. Legally the captive miners could walk out next week (July 12) but present indications are that they won't.

While the possibility of a steel strike hasn't boomed steel buying it has stepped up pig iron sales. Foundries have been laying in pig iron stocks against the possibility of a shutdown and some furnaces will ship more pig iron during the first 2 weeks of July than they shipped during any of the last 3 months. A contributing factor to this pickup has been an overdose of foundry inventory cutting—to the point where many were practically working from freight cars. Also, some farm implement foundries have found business holding up better than they thought.

A number of the smaller steel companies now feel that they have reached bottom for the time being. While they report a definite increase in inquiries during the past few weeks, few of these have been turned into orders. The larger mills with broader product ranges still have some distance to go before they reach what may look like a temporary low point.



Acclaimed a Masterpiece...

CLUTCH HEAD *Brightens the Profit Picture with 15% to 50% Assembly Increases*

Here is how CLUTCH HEAD'S modern design meets today's competitive selling problem of "*How to Produce More for Less*"... by effecting time and cost savings that quicken production steps all the way down the assembly line.

High Visibility of the roomy recess presents an easy-to-hit target. "Green" operators require no break-in. They drive with speed and confidence that checks out slow-down hesitation.

Chewed-up Heads Eliminated because dead-center entry with the Center Pivot Column prevents driver canting and makes straight driving automatic.

Safe Non-tapered Driving eliminates the danger of driver skidding from "ride-out" as set up by tapered driving . . . an important safety factor for the protection of manpower and material.

Zero in Skid Damage is reported by CLUTCH HEAD users. The all-square contact of the straight-sided driver with the straight-walled recess makes high torque driving almost effortless.

A Fatigue Factor Disposed Of. Absence of end pressure means safer, faster, easier driving. No end-of-the-shift lag means more screws driven for higher production.

Up to 214,000 Screws Driven non-stop by the Type "A" Bit . . . without interruption for tool change or reconditioning. Add to this record performance the fact that a 60-second on-the-spot operation restores this bit to original efficiency . . . *repeatedly*.

The Lock-On Overcomes Fumble Spots. A reverse turn of the bit in the recess forms a frictional hold that unites screw and bit as a unit. This permits quick, easy one-handed reaching to inner spots.

Speeds Field Service Too. With the Type "A" Hand Driver, field service men find it easy to withdraw "frozen" screws undamaged and safely held by the Lock-On on the end of the bit for re-use.

Common Screwdriver Operation. This is the *ONLY* modern screw with a recess basically designed for operation with a flat blade . . . which need only be reasonably accurate in width. Important to simplified field service.

CLUTCH HEAD SCREWS

These highlights of America's Most Modern Screw are fully detailed and illustrated in the NEW CLUTCH HEAD BROCHURE. *Send for your copy and indicate the sizes and types of screws that interest you.*

UNITED SCREW AND BOLT CORPORATION

CLEVELAND 2 CHICAGO 8 NEW YORK 7

Declining World Steel Markets Spur Cartel Talks in Europe

But International Scope Is Unlikely; Leaders Here Will Not Take Part

o o o

By BILL PACKARD
News Editor

o o o

New York

• • • **Efforts are again** being made to revive the once flourishing international steel cartel. These efforts are being spurred by the rapid shifting of balance between supply and demand in the world steel market.

There is little chance that the cartel can be restored to its prewar scope and effectiveness in the near future. For one thing, steel leaders in this country will have no part of it. But some Western European steel producers have never stopped thinking that this is the best way for them to market their products. Although there are obstacles barring sudden and complete agreement, even among them, they agree in principle.

Nucleus of present efforts to revive the "gentlemen's agreement" on steel is a series of talks between Belgian and Luxemburg steel producers. These talks have been aimed at (1) reestablishing selling organizations, (2) maintaining home prices, and (3) agreeing on export prices.

Latest information indicates some agreement may have already been reached on these points. It is believed that details on quotas are still to be fixed. This is one of the obstacles. Some producers have expanded more than others, compared with prewar status, and they are seeking adjustment of their quota. Agreement on this point should not prove too difficult. Meanwhile, negotiations continue.

Contacts have also been initiated to fix price policy and delivery delays — according to conditions prevailing in free and organized markets. This leads to the conclusion that if they fail to restore the cartel to international scope, a compromise plan for a "little" cartel in Europe is probably in the cards.

The international climate of steel business is becoming more and more favorable to the growth of the cartel idea. Glum market factors, which have been evident in the U. S. for several months, have shown up in nearly all European countries in the past few weeks. Foremost among these factors are (1) a slowing rate of new orders, (2) extensive cancellations of old orders, and (3) increasing caution by warehouses and consumers toward inventory.

As in this country, all these factors appear to be influenced by the hope of consumers that steel prices may be lowered. At present this hope doesn't appear to be justified. But that doesn't prevent it from exerting a strong influence on steel business. Compared with recent months the decrease in new business is believed to average about 20 pct.

Nearly every European steel producer insists that potential steel needs are still very high. They blame the recent slip off in orders to a shortage of money in the hands of customers.

This disconcerting news is even more bleak when compared with European production records of recent months. With the exception of Germany, nearly every country in Europe is making steel faster than ever before in its history. During the past 3 months the production achievements in England

No Cooperation

and France, particularly, have been little short of startling.

Thus it is not surprising that steel producers everywhere should be thinking in terms of holding or strengthening their market position. Nor is it surprising that the hub of the cartel movement should be in Luxemburg and Belgium. Compared with its domestic markets, Luxemburg was before the war the largest steel exporter. The prewar cartel probably found its strongest support in this country, and the central organization operated from there with government cooperation. The general position of Belgium is about the same.

Enthusiastic procartelists claim that the prewar cartel accomplished the following things: (1) Stabilized prices, employment, and production, (2) prevented ruinous competition without acquiring a monopoly, (3) improved the quality of products and cooperated with consumers and (4) adjusted output to demand, avoiding unhealthy capacity expansions.

Steel leaders in this country will not support the cartel, even if some or all of the European nations want it. The Steel Export Assn., which operated in the international cartel before the war, has long since ceased to function. It is now defunct, and there are no plans for its resurrection.

At least some steelmakers believe that Europe today is as restrictive minded commercially as ever. They believe this is manifested in drives for socialization of European industry, which is merely "a change from private restrictions to government restrictions."

The Administration has steadfastly opposed cartels in Europe. ECA Administrator Paul G. Hoffman has also spoken effectively on the subject. Before a joint session of the Senate Foreign Relations Committee and House Foreign Affairs Committee on Feb. 8 this year, he said: "The effective reconstruction of the economy of Europe cannot be achieved through attempts to restore the prewar pattern. The task calls for rebuilding the economy of Europe along bold new lines."

Bendix Strike Settlement Eases Pressure on Parts

South Bend, Ind.

• • • **Settlement** of the recent 70-day old Bendix strike will undoubtedly ease the pressure on jet engines and aircraft parts but it is likely to have little immediate effect on auto production.

During the strike most auto companies obtained court orders permitting them to remove brake dies to their own plants. Temporarily, production at Nash and Hudson was affected by the strike and operations in other auto plants were seriously threatened.

Prior to the strike Bendix was a major source of supply for brake assemblies for Ford, several GM divisions, Kaiser-Frazer, Packard, Hudson, Nash and others. Company spokesmen have declined to say whether or not their present sources of supply will be continued or their business will again be placed in South Bend.

Following the extended strike at Campbell, Wyant & Cannon Foundry in Muskegon last year, several auto firms turned permanently to other sources of supply, it is reported.

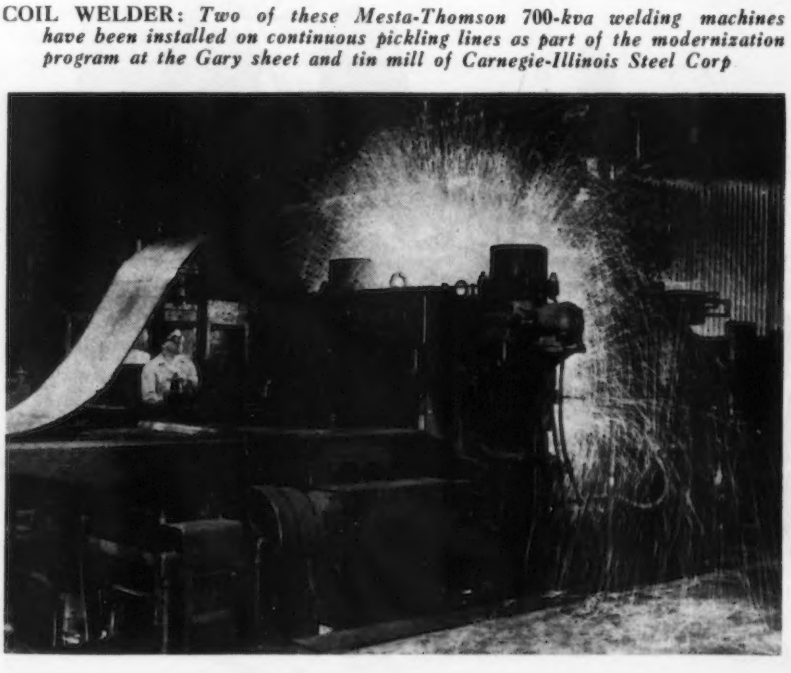
Railroads Cooperate With Chicago's Smoke Control

Chicago

• • • **At the Chicago** Assn. of Commerce & Industry Cleaner Air Committee, the railroad subcommittee was told by Sam Radner, of the city's department of smoke inspection, that so far this year they have done a good job. In the first 5 months of 1949, the railroads were charged with only 31 pct of all smoke ordnance violations in Chicago. For the same time last year they were charged with 43 pct, and the first 5 months of 1947 railroads committed 65 pct of the total violations. At the meeting the railroads were congratulated on their excellent cooperation by the city smoke department.

W. W. Matzke, assistant to the vice-president of the Chicago & North Western R.R., outlined North Western's five point program of smoke abatement. The essentials of the program include careful investigation into the conditions concerning every smoke violation charge, careful selection of proper fuels, proper maintenance of mechanical equipment, intensive research on equipment and techniques for efficient firing of locomotives, and extensive instruction of employees, including the use of a motion picture on smoke abatement produced for this purpose by the railroad.

COIL WELDER: *Two of these Mesta-Thomson 700-kva welding machines have been installed on continuous pickling lines as part of the modernization program at the Gary sheet and tin mill of Carnegie-Illinois Steel Corp*



May Car Registrations Will Set Postwar Record

Detroit

• • • **May new car** registrations will surpass any month in the postwar period, according to R. L. Polk, statisticians for the automobile industry.

Polk officials have predicted May passenger car registrations will surpass 425,000 compared with an estimated figure of 390,000 units for April and 360,584 during March.

Trucks registrations for May are expected to equal 80,000 units. This is somewhat lower than the figure reported a year ago but still higher than for many postwar months. Heaviest registrations are in the 5000 lb gross vehicle weight classification, Polk said.

Union Feud Continues

Chicago

• • • **The feuding** of the two rival unions for control of the farm equipment workers is not over, despite the fact that both the CIO, UAW, and United Farm Equipment Workers have signed separate contracts with the International Harvester Co. Last month the FEW signed a new contract, which according to the union, covers 40,000 workers. Last weekend UAW and Harvester extended their contract for 1 year with the new provision permiting a reopening for wage negotiations and pensions. This agreement covers 18,500 employees.

In the past year several of Harvester's plants have been battlegrounds in which the two unions tried to gain control. One FEW spokesman declared that the signing of separate contracts now ends the jurisdictional battle between the two unions and that the new contracts prevent further raiding by the UAW. The UAW international representative promptly termed FEW's continuing defiance as an act of treachery.

Future courses to be pursued by the two unions will probably be decided at the national conventions this year. UAW will hold its convention, July 10 to 17, in Milwaukee, and the national CIO convention opens in Cleveland, Oct. 31.

General Refractories Opens New Research Lab

Baltimore

• • • **A new** $500,000 research and development laboratory, which will have as one of its principal objectives the perfection of the all-basic openhearth furnace, was opened here recently by General Refractories Co.

Located on the grounds of the company's largest manufacturing unit, the laboratory combines facilities for both research and development and for pilot plant production.

While work on the basic furnace, revolving in a large measure around the company's new type suspended refractory, the Steelklad Ferroclip, will be one of the principal projects here, the laboratory will also investigate problems in other types of refractories, mortars, cements and plastics.

In addition to extensive facilities for analytical, spectrographic and petrographic work the new laboratory also features equipment for physical testing, including ASTM panel tests, hot and cold strength tests, and testing of mortars, cements and plastics. A unit for investigating the effect of CO on blast furnace refractories is also available.

The pilot plant section of the laboratory includes a 450-ton hydraulic press, a 30-ft rotary kiln, as well as a wide variety of mills, wet and dry pans, mixers and an extrusion press.

Industrial Briefs . . .

• TOPS IN SAFETY — The nation's highest safety award will be presented to the 12,500 U. S. Steel employees at Lorain Works of National Tube Co. for achieving one of the best safety records made recently in heavy industry.

• THANKS A MILLION— A gift of $1 million from Alfred P. Sloan, Jr., chairman of the board of the General Motors Corp., has been received by the Massachusetts Institute of Technology for construction of a Metal Processing Laboratory building.

• ROLLING STRIP—The Magnesium-Aluminum Div. of Revere Copper & Brass Inc., Baltimore, will start rolling strip aluminum on a full-time production basis beginning in August.

• V.I.P.—Walter A. Gorrell, has been named president of the Pressed Metal Institute. Mr. Gorrell recently retired as president of the E. J. McAleer Co., Philadelphia, and was, until this spring, chairman of the Philadelphia district of PMI.

• BRAKE SHOE ADDS — American Brake Shoe Co. has announced that it has contracted to purchase from the War Assets Administration a former war plant at 344 Vulcan St., Tonawanda, N. Y. The plant will be operated by Brake Shoe's Ramapo Ajax Div., manufacturers of railroad frogs, switches and special trackwork.

• TAKES OVER — Parker Mfg. Co., Worcester, has announced the acquisition of Ackermann-Steffan Co., Chicago, manufacturers of Trojan Brand coping, jig, power machine and jewelers' saw blades and coping, jewelers' scroll and hack saw frames.

• NEW LOCALE—The Warner & Swasey Co., Cleveland, has moved its New England district office from the Kendall Square Bldg., Cambridge, Mass., to 20 Chestnut St., Needham, Mass.

• CHANGES MADE—The Sturgis Products Co., Sturgis, Mich., producer of Roto-Finish materials, equipment and processes for mechanical finishing, has changed its corporate name to the Roto-Finish Co. and moved all sales and manufacturing to its new plant in Kalamazoo, Mich.

• HONORABLE AWARD—Dr. Carl A. Zapffe and Miss M. E. Haslem have been awarded a Certificate of Honorable Mention by the Wire Assn. for presenting the outstanding paper to the ferrous division of that industry in 1948.

• GOING EAST—The Greenfield Tap & Die Corp. has announced the removal of their Ampco Twist Drill manufacturing facilities from Jackson, Mich., to Greenfield, Mass. The corporate structure of the Ampco Twist Drill Corp. has been dissolved and all assets transferred to Greenfield where a complete drill making establishment is being set up.

• NEW CHEM DIVISION — Reynolds Metals Co. has announced the establishment of its Chemical Div. to handle its line of specialties used by the chemical industry. I. P. Macauley, vice-president, will head the new division with headquarters at 19 E. 47 St., New York. Products currently being produced include aluminum hydrate, calcined alumina and R. R. aluminum.

• MORE ROOM — Elmes Engineering Div. of American Steel Foundries, manufacturers of hydraulic machinery products, has moved from Chicago to larger quarters at 1150 Tennessee Ave., Cincinnati.

• WELDING AGENT—Virginia Welding Co., 114-116 Virginia St., E., Charleston, W. Va., has been appointed a distributor by Hobart Bros. Co., Troy, Ohio, for their full line of welding equipment, including DC and AC arc welders, accessories and electrodes.

Authorizes Increase In Export Quota For Galvanized Sheets

Washington

• • • **A supplemental** third-quarter export quota of 7500 tons of galvanized iron and steel sheets, 18-gage and heavier, has been authorized by the Office of International Trade. The supplemental tonnage brings the total third-quarter quota for galvanized sheets to 22,500 tons.

Reason for the increased quota is the recent general improvement in the domestic supply of heavyweight galvanized sheets, OIT said. License applications submitted under the supplemental quota will be received by OIT during the period July 1 through July 15.

Purchasing Agents Elect

Chicago

• • • **The National** Assn. of Purchasing Agents elected new officers for the coming year at the 3-day convention held at the Stevens recently. C. A. Corcoran, purchasing agent of the *Courier-Journal* & Louisville *Times*, Louisville, was elected president. Mr. Corcoran succeeds Ralph O. Keefer, Aluminum Co. of America, Pittsburgh.

Other newly elected district vice-presidents are:

Walter N. McFee, Kelly-Douglas & Co., Ltd., Vancouver, B. C.; Walter L. Barrel, purchasing agent of Tarrant County, Ft. Worth, Tex.; William H. Hunt, Nicholson File Co., Providence; H. F. Jones, E. I. Du Pont de Nemours & Co., Wilmington, Del.; Arther G. Pearson, American Meat Institute, Chicago; R. M. Patrick, Plantation Pipeline Co., Atlanta; Laurie C. Wakeful, Minnesota Paint, Inc., Ft. Wayne, Ind.; Thomas D. Hudson, American Steel & Wire Co., Cleveland; and T. H. Ainly, B. F. Goodrich Rubber Co., Kitchener, Ont.

Building Dam Gates

Sunnyvale, Calif.

• • • **Construction of** 10 tractor gates for the garrison dam in North Dakota being built by the U. S. Army Engineers has begun at the local plant of Westinghouse Electric Corp. here. Each gate will utilize approximately 50 tons of structural steel and when completed will measure 15-ft by 30-ft by 3-ft and will be machined to exacting tolerances. Each gate will be equipped with 225 six-in. rollers and will operate to control flow of water at the intake tunnel of each penstock. It is anticipated that delivery of all gates will be completed late in 1950.

Begin Hearings on Ford Production Standards

Detroit

• • • **On the basis** of an agreement reached May 29, a three-man panel began hearings recently on the disputed production standards which resulted in the Ford strike.

One member of the panel was selected by the company and one by the union. The third member agreed upon is the permanent impartial umpire under the Ford contract, Harry Shulman.

It is expected that several weeks will elapse before a decision is reached.

Meanwhile, negotiations between the company and union on the new Ford contract have begun. The present contract expires July 15.

Copper Production For April Sets 5-Year Record

Ottawa

• • • **Copper production** in Canada for April at 22,500 tons made a 5-year record and compares with 21,900 tons in March and 20,900 tons in April 1948. April output was the highest since January 1944, when 24,400 tons were produced.

Nickel production in April fell to 10,600 tons from the 12,600 tons of the month immediately preceding and 13,200 tons in April 1948. Production for the first 4 months this year showed a slight gain at 45,300 tons against 44,100 tons in the like period of 1948.

Canadian Iron Ore Lowest In Phosphorus Content

Toronto

• • • **Steep Rock** and Michipicoten iron ore shipments in 1948 were among the lowest in phosphorus content of all the Lake Superior ranges. Both Steep Rock and Michipicoten ores are classified as Bessemer grade which requires a phosphorus content of not over 0.045 pct.

The average analysis of the 507,231 tons of sinter shipped from the New Helen Mine in Michipicoten last year was 49.69 pct natural iron, 0.015 pct phosphorus, 11.73 pct silica, 3.08 pct manganese and 1.77 pct moisture.

Shipments from Steep Rock Iron Mines totaled 679,233 tons averaging 52.66 pct natural iron, 0.027 pct phoshorus, 6.22 pct silica, 0.22 pct manganese and 9.18 pct moisture.

Ford Purchases New York State Site For Possible Parts Plant

Detroit

• • • **Another indication** that automobile manufacturers are tending to move close to their steel suppliers was seen in the announcement last week that Ford Motor Co. has purchased 100 acres of land near Hamburg, N. Y., for possible use as a pressed steel plant.

The new plant site is about 1 mile from Ford's Buffalo assembly plant and is close to the Lackawanna plant of Bethlehem Steel Co.

The announcement said that studies are being made to determine the suitability of the new location to make parts for Ford passenger cars and subassemblies. Ford indicated that this is one of several projects the company has in mind for expanding its present plant facilities.

RFC Tells Lone Star To Seek Private Credit As Aid in Getting a Loan

Washington

• • • **The Reconstruction** Finance Corp. last week turned thumbs down on a request for a $74 million loan from the Lone Star Steel Co.

The amount sought by the Daingerfield, Texas, steel firm represented 100 pct of the funds required for a proposed expansion program. RFC, in denying the request, said it lacked authority to grant a 100 pct loan in so large an amount.

RFC customarily requires loan applicants to obtain about half of the total amount sought from nongovernment sources. The agency told E. B. Germany, president of Lone Star, to explore the possibility of obtaining equity financing from private credit sources before drafting a new RFC application.

"The RFC's policy in these cases is to match dollars," one agency official told THE IRON AGE. "Congress would have to rewrite the RFC law before we could hand out that kind of money without any equity financing."

Representative Patman, D., Texas, in whose congressional district Lone Star is located, said he would continue his efforts to obtain a government loan for the firm.

Coming Events

July 11-16	**Concrete Reinforcing Steel Institute**, annual meeting, White Sulphur Springs, W. Va.
July 17-19	**Institute of Scrap Iron & Steel**, midyear meeting, Atlantic City, N. J.
July 20-22	**Pressed Metal Institute**, annual convention, Cleveland.
Sept. 12-16	**Instrument Society of America**, conference and exhibit, St. Louis.
Sept. 14-16	**Porcelain Enamel Institute**, annual forum, Columbus, Ohio.
Sept. 25-Oct. 1	**American Institute of Mining & Metallurgical Engineers**, midyear meeting, Columbus, Ohio.
Sept. 26-28	**National Electronics Conference**, Chicago.
Oct. 3- 5	**American Coke & Coal Chemicals Institute**, annual meeting, Skytop, Pa.
Oct. 4- 6	**Industrial Packaging & Materials Handling Exposition**, annual convention, Detroit.
Oct. 10-14	**American Society for Testing Materials**, West Coast meeting, San Francisco.
Oct. 12-15	**Electrochemical Society**, semiannual meeting, Chicago.
Oct. 13-15	**Foundry Equipment Manufacturers Assn.**, annual meeting, White Sulphur Springs, W. Va.
Oct. 17-21	**National Metal Congress**, Cleveland.
Oct. 24-26	**American Gear Manufacturers Assn.**, annual meeting, Chicago.
Oct. 26-28	**National Metal Trades Assn.**, annual convention, Chicago.
Oct. 27-28	**Gray Iron Founders Society**, annual meeting, Chicago.

British Industrial Experts Here to Study American Practices

Washington

• • • **A team of six** industrial experts from the United Kingdom arrived in New York City on July 5, to start a month's study of simplified practices used in American industry.

The visit of the English experts has been arranged by the Anglo-American Council on Productivity in cooperation with ECA's Technical Assistance Div. The council attaches particular importance to the study-project because of the benefits that may be derived through standardization, simplification and specialization. The council points out that the adoption of simplified practices may result in lower costs and greater production by limiting the sizes or grades of products manufactured.

The visitors will hold discussions with U. S. Government agencies, national professional organizations and trade associations and visit typical American firms where simplified practices are in effect. The group hopes to secure information on American achievements in this field, methods employed, degree of success and effect on productivity and cost.

On their return to England, the experts will present a report to the Anglo-American Council covering their assessment of how far the American methods can be adapted to British conditions and the extent to which it would be of benefit to British industries.

The group is composed of the following: Major General J. S. Crawford, director of Guy Motors, Ltd., vice-president of the Society of Motor Manufacturers and Traders and chairman of the society's standardization committee; C. A. Martin of British-Thomson-Houston Co., Ltd.; Robert Neill, a director of Joseph Lucas Electricals, Ltd.; G. Weston, deputy director of the British Standards Institution; Bertram White, technical director of the Federation of British Industries; and C. J. A. Whitehouse, secretary to the Ministry of Supply Committee on Standardization.

Pressed Metal Institute Names Gorrell President

Cleveland

• • • **At a meeting** of the board of trustees of the Pressed Metal Institute recently, Walter A. Gorrell, prominent in the metal stamping industry, was named president. Mr. Gorrell recently retired as president of the E. J. McAleer Co., Philadelphia, and was, until this spring, chairman of the Philadelphia district of PMI.

The quarterly meeting of the board of trustees, held at Port Huron, Mich., took on added importance at this time as the board undertook the perfecting of plans for the annual convention to be held in Cleveland, July 20-22. Important actions of the group involved the selection of the membership of standing committees for the coming year, the preliminary outlining of programs for these committees, and the drafting of proposed revisions to the institute's constitution.

The following were named to committees by the board: Committee on Technical Research and Standards: J. J. Boehm, Boehm Pressed Steel Co., Cleveland; Carl F. Carlstrom, Worcester Stamped Metal Co., Worcester; A. Clements, Clearing Machine Corp., Chicago; W. M. Diehm, New Holland Machine Div. of the Sperry Corp., Lancaster, Pa.; Jack Dister, McCauley Metal Products, Buffalo; J. W. Kootz, S. W. Evans & Sons, Philadelphia; James Leake, Leake Stamping Co., Monroe, Mich.; Ray Peterson, Peterson Engineering Co., Toledo.

Committee on Industry Mobilization: W. F. Ardussi, Variety Machine & Stamping Co., Cleveland; Samuel Hull, Worcester Stamped Metal Co., Worcester; Frank Loftus, Res Manufacturing Co., Milwaukee Wm. H. Miller, Bossert Co., Utica, N. Y.; Wm. P. Von Behren, Swartzbaugh Mfg. Co., Toledo; Wilfred Williams, Acklin Stamping Co., Toledo; Howard C. Wolf, Mullins Mfg. Co., Salem, Ohio.

Committee on Industrial Relations: Walter Baird, Toledo Pressed Steel Co., Toledo; Ralph Boyle, National Stamping Co., Detroit; Carter C. Higgins, Worcester Pressed Steel Co., Worcester; E. Linehart, Follansbee Steel Corp., Pittsburgh; I. Morrison, Morrison Products Co., Buffalo; Warren A. Peterson, Peterson Products Co., Chicago; Hugo J. Plas, Dickey-Grabler Co., Cleveland; Harry F. Smith, Acklin Stamping Co., Toledo.

Committee on Statistics: T. L. Baker, National Stamping Co., Detroit; Ralph B. Britton, Stanley Works, New Britain, Conn.; H. P. Hopp, H. K. Metalcraft Co., New York; Wm. J. Primrose, Jr., Dickey-Grabler Co., Cleveland; C. O. Rainey, Morrison Products Co., Buffalo; H. S. Robinson, Cincinnati Shaper Co., Cincinnati; C. A. Rooke, Freeway Washer & Stamping Co., Cleveland.

NAILABLE ALL-STEEL DECKS: *Shown in the photograph is the Great Lakes freighter GEORGE W. MEAD which carries* 100 *automobiles on its superdeck. The deck is formed of nailable steel floor channels produced by Great Lakes Steel Corp. The channels are welded to a structural steel framework built up from the ship's main deck. Wood blocks, held by nails driven into grooves between the curved steel channels, hold the cars in place.*

Commerce Planning To Shift More Galvanized Sheets to Grain Bins

Washington

• • • **The Commerce Dept.** is getting ready to divert more galvanized sheets for grain bins. The Voluntary Allocation Program now being administered by the Office of Industry Cooperation calls for earmarking 8000 tons of galvanized sheets for grain bins per month between now and Sept. 30.

Although realizing that such sheets are in heavy demand, OIC is preparing to up this diversion to about 18,000 tons a month—more than double the present allocation.

Congress, in a recent extension of the Commodity Credit Corp. Act, authorized farmers to buy grain bins for crop storage. But galvanized sheet will take care of only some of the new bins.

Earl Clark, OIC director, recently pointed out that the housing industry is also asking for large tonnages of galvanized sheet for duct and pipe work.

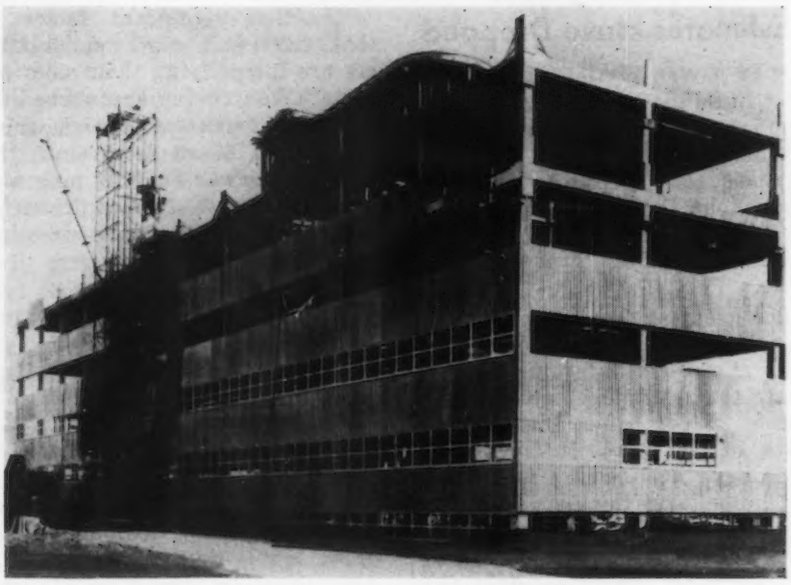
"When I first went into this we had quite a debate as to whether that would penalize the housing industry," he stated. "I can say now that we will be able, I am sure, without penalizing the housing industry, to increase galvanized sheet for this type of structure. These are the small farm-type bins, the round type that the farmer buys himself."

Mr. Clark said the list of steel producers who are currently in the voluntary program for storage bins includes the following:

Armco Steel Corp., Continental Steel Corp., Granite City Steel Co., Inland Steel Co., Newport Steel Corp., Parkersburg Steel Co., Republic Steel Corp., Sharon Steel Corp., Niles Rolling Mill Co., U. S. Steel Corp., Weirton Steel Co. and Wheeling Steel Corp.

The Reeves Steel and Manufacturing Co., Dover, Ohio, has offered to participate in the program, Mr. Clark stated.

The grain bin allocation program is one of 19 voluntary rationing programs now being administered by OIC. All of them will expire Sept. 30. Both Secretary of Commerce Sawyer and Mr. Clark have gone on record as stating that they do not intend to ask Congress to extend the program beyond that date.



New Building Uses Cast Aluminum Wall Panels

Davenport, Iowa

• • • **A new type office** building using cast aluminum panels for exterior walls has recently been completed here for Aluminum Co. of America. The 4½-story structure will serve as an administration building at Alcoa's new sheet and plate rolling mill on the banks of the Mississippi above Davenport.

It may well be the pilot model for Alcoa's proposed 30-story skyscraper scheduled to begin rising in downtown Pittsburgh in the fall of 1950. Fluted aluminum curtain walls—cast panels backed by 4 in. of concrete—are the principal new design feature and required years of developmental work. This was done by Alcoa's architectural division in collaboration with architects Harrison & Abramovitz, Inc., and builders, George A. Fuller Co., both of New York. Alcoa officials hope that the saving in floor space achieved by the new thin wall construction will interest builders of structures in densely populated metropolitan areas where a few thousand extra feet of floor space will pay dividends.

This construction, Alcoa notes, saves most of the space taken up by masonry and brick walls of conventional buildings. Several innovations were made in construction methods in the Davenport building. Materials were conveyed to upper stories of the structure and installed from within, eliminating the use of outside scaffolding, rigging and derricks. This less hazardous technique will mean lower insurance rates in metropolitan building.

The sectional aluminum panels were fitted with cast anchors to simplify their attachment to the supporting beams. In addition to the well known architectural uses of aluminum a few relatively new developments were used, including cementing aluminum foil to the inner walls as a moisture vapor barrier and installation of dehumidifying equipment using activated alumina.

Other applications of aluminum in the new administration building include doors, partitions, elevator cabs, lighting fixtures, electrical conduit, hardware, wainscoting, acoustical ceilings, ornamental trim and appointments.

Declares Building Cost Estimates Have Dropped

New York

• • • **Building cost** estimates have dropped as much as 25 pct in some sections of the country, and this decrease is spreading rapidly throughout the nation, according to Guy B. Panero, head of a New York engineering firm of that name.

The greatest drops in cost have been in the Midwest, according to Mr. Panero, and latest figures indicate that estimates are approximately 25 pct below the all-time highs of last year. In New York costs have declined 10 to 15 pct, and he believes the drop will continue through the rest of the year.

Mr. Panero listed three reasons for declining building costs: (1) The cost of building materials is falling, and delivery dates can be quoted with a good degree of accuracy; (2) Competition is increasing among builders for jobs; (3) Labor productivity is increasing.

"Availability of mechanical equipment is typical of the materials situation in almost all phases of the construction program. Some power house equipment, which last year was being promised for 2-year delivery, is now available in 6 months. A similar trend is in evidence in air conditioning equipment, piping, elevators and other mechanical components.

"Another significant factor is that more and more manufacturers are intensifying their sales efforts. "We're being approached by sales representatives of companies we haven't heard from since the start of the war building program. For 10 years we shopped primarily for delivery; today we're shopping for price."

Operations Slated for New Alcoa Mill In '50

Vancouver, Wash.

• • • **Aluminum Co.** of America is expecting to get its aluminum rod, wire and cable mill in operation here by January or February of 1950. Preliminary work on the plant location consisting of grading and pile driving is completed on schedule.

C. S. Thayer will be works manager for both the reduction works and the new wire mill. E. W. Mairs, assistant works manager of the fabricating division at Massena, N. Y. will be works manager for the Vancouver fabricating division and R. W. Knapp, melting department superintendent at Newark, Ohio will be his assistant. B. H. Sloane, now production superintendent at the reduction works here will become works manager of that division with C. T. Heins as assistant.

REMOTE CONTROL: *A remote control unit for use with the Westinghouse "65" line of ac welders permits the operator to change the current setting and thereby adjust the arc without walking back to the machine. The operator simply presses either the "raise" or "lower" pushbutton on the small portable station and a small motor moves the core, making the necessary adjustment.*

Allis-Chalmers Opens Facilities for Testing Centrifugal Pumps

Milwaukee

• • • **Allis-Chalmers** has just opened a new centrifugal pump test floor containing some of the most efficient and accurate pump test facilities ever developed. The facilities provide both maximum testing accuracy and minimum testing time and expense. Equipment includes some new applications of equipment worked out by Allis-Chalmers engineers in conjunction with equipment manufacturers, and some devices designed and built by Allis-Chalmers especially for this application.

Most interesting of the new instruments is a speed measuring device believed to be the most accurate ever built for continuously measuring and recording speed. It is used with a Baldwin electric strain-type torque meter to obtain the horsepower input into a pump.

Other new equipment for measuring quantity of water pumped involves the use of weight tanks rather than wires. This method makes possible the taking of test points automatically by means of a photoelectric cell which reads the weight tank scale. Motor speed, torque and pump discharge and inlet pressure are all recorded continuously during the test run. The recording meters and test timers for this equipment is controlled by the photoelectric circuit.

Permanent test stands with movable individual hydraulic powered motor and pump pedestals permit the pumps to be lined up simply by means of control levers and eliminate the tedious shimming and shifting the motor around by hand. Designed for easy connection to the pump flanges are the suction and discharge piping which is made of aluminum so it can be handled easily without need for hoists or cranes. Multihorsepower, multispeed motors on the stands cover a wide range of speeds and horsepowers, so that motors rarely have to be interchanged to accommodate different types of pumps. These various features are expected to cut the time and labor required for testing by at least 60 pct.

English Pressed Metals Team Here To Study American Productivity Methods

Washington

• • • **A tentative** visiting schedule has been arranged for a team from Great Britain's pressed metals industry which arrived in the United States on July 5. The group will make a month's study of productivity methods in 15 American plants under auspices of the Economic Cooperation Administration.

The 10-man team, which includes workers, technicians and supervisors, is the fourth sponsored by the Anglo-American Council on Productivity in cooperation with ECA's Technical Assistance Div.

Visit arrangements for the pressed metals team are being made by the New York branch of ECA's Technical Assistance Div. with the cooperation of Orrin B. Werntz, managing director, Pressed Metals Institute; Jerry Singleton, assistant managing director, Pressed Metals Institute; Brendan Sexton, assistant director of education, UAW-CIO; and Meyer Bernstein, assistant director of education, USWA-CIO.

The team is scheduled to observe methods and techniques in the following plants between July 8 and Aug. 2:

Worcester Pressed Steel Co., Worcester; Morrison Steel Products, Buffalo; Federal Enameling & Stamping Co., McKees Rocks, Pa.; Ackerman Div., Wheeling Steel Corp., Pittsburgh; Mullins Mfg. Corp., Salem, Ohio; Fisher Body Div., General Motors Corp., Cleveland; American Stamping Co., Cleveland; Republic Steel Corp., Cleveland; Dickey-Grabler Co., Cleveland; Willys-Overland, Toledo; Acklin Stamping Plant, Toledo; Detroit Stamping Co., Detroit; National Stamping Co., Detroit; Heintz Mfg. Co., Philadelphia, and Edward G. Budd Co., Philadelphia.

James Milner Phillips, managing director, Motor Panels, Ltd., Coventry, will be team leader, and Arthur Jacques, secretary, Motor Panels, Ltd., Coventry, will act as secretary. Other team members are:

A. W. Menzies, Armstrong Whitworth Aircraft, Ltd.; William James Mair, Briggs Motor Bodies, Ltd.; Leslie George Best, Pressed Steel Co., Ltd.; Sidney Cadman, Fisher & Ludlow, Ltd.; Rex Donald Chapman, Vauxhall Motors, Ltd.; Cyril Arthur Mawson, Pressed Steel Co., Ltd.; Frederick Robert Watts, Motor Panels, Ltd.; and Edgar James Young, Vauxhall Motors, Ltd.

42 Years With U.S. Steel

Pittsburgh

• • • **Oscar N. Lindahl,** vice-president of finance, Carnegie-Illinois Steel Corp., has retired after 42 years' service with U. S. Steel subsidiary companies.

Mr. Lindahl began his career with U. S. Steel in 1907, coming to Illinois Steel Corp. in Chicago from Butler Bros., wholesale merchandisers there. In 1911 he joined Universal Portland Cement Co., now Universal Atlas Cement Co. He left the cement company in 1941 when he was elected vice-president and director of Carnegie-Illinois. He is a vice-president and director of the Carnegie Libraries of Braddock, Homestead and Duquesne, and a director of U. S. Steel and Carnegie pension fund.

Receives Safety Award

Chicago

• • • **Binks Mfg. Co.** of Chicago, has received the safety award of the Lumberman's Mutual Casualty Co. for completing 1 million man-hr work time without a disabling injury. According to the National Safety Council, only 6 out of 1000 industrial plants in the country are able to operate for that length of time without a lost-time accident. A plaque commemorating the award was presented to Burke B. Roche, president of Binks, by W. D. Keefer of Lumberman's Mutual.

Army Lets Hospital Work

Washington

• • • **Contracts** for construction of a $3.5 million, 200-bed hospital at Phoenix, Ariz., have been awarded by the Army Corps of Engineers as follows:

General construction, Del Webb of Phoenix, $3,161,000; quarters buildings, Stewart Construction Co. of Phoenix, $177,990; outside utilities, Fisher Construction Co. of Phoenix, $84,200; elevators and lifts, Otis Elevator Co. of San Francisco, $101,678.

RIDING COMFORT: *Elimination of jerky starts and stops on modern trolley cars is accomplished with this barrel-like electric accelerator that provides "99 steps to riding comfort" for passengers. When the operator steps on the accelerator pedal, the X-shaped arm revolves, the two wheels press down the 99 electrical contacts in rapid succession, and power is fed to the trolley's driving motors in "steps" so close together it seems like one steady surge.*

Idleness From Strikes Increased During May

Washington

• • • **For the first** time since the spring of 1947, the number of new strikes has exceeded that of the same month of the previous year.

New strikes in May totaled 450 as against 400 in April and 339 a year ago, according to the Bureau of Labor Statistics. Total man-days lost in May were estimated at 3.2 million against 1.8 in April and 4.1 million in May 1948.

Major cause for the May idleness was the 24-day strike of about 62,000 Ford workers. Other sizable strikes involved 8600 workers of the Singer Mfg. Co. and 10,000 Philco employees.

When strikes continued over from April are included, a total of around 600, involving 32,000 workers were in effect at one time or another during May, BLS said.

New Lab Firm Founded

Pittsburgh

• • • **A new firm** has been formed here to perform complete spectrographic and wet chemical analysis service for producers of steel, aluminum, magnesium, bronze, ceramic materials and industrial chemicals. Spectrochemical Laboratories, Inc., the new company, is located in the First National Bank Bldg., 1010 Wood St., Wilkinsburg, Pa.

Eugene M. DuBois, president and chief spectrographer, says that the purpose of his new enterprise is to make spectrographic analyses available quickly and accurately to industrial firms that do not have their own spectrographic laboratories. He was formerly laboratory director of Orefraction, Inc., Pittsburgh.

Union Demands for Chrysler

Detroit

• • • **Chrysler Corp.** has been served with a series of demands by the UAW-CIO that are almost identical with the Ford demands for $100 per month pensions, hospitalization insurance and a cost-of-living wage increase.

The Chrysler contract runs until 1950 except for wages which may be reopened this year. Should the company insist that pensions are not a part of wages, the UAW-CIO is expected to boost its wage demands to cover the fringe benefits.

Meanwhile, it has been announced that Ford negotiations will be speeded up and that meetings will continue through the UAW-CIO convention in Milwaukee early in July.

UAW locals are preparing to take a strike vote that would authorize a second Ford strike this year.

Tin Controls Extended

Washington

• • • **President Truman** has signed legislation (H. R. 5044) extending controls over tin and tin products until June 30, 1950.

During Capitol Hill debate on the measure, Congressional leaders declared that some gain in tin production is to be expected this year, with output estimated—prior to the Bolivian strikes—at about 170,000 tons.

World production totaled about 153,000 tons in 1948, as compared with 113,500 tons in 1947 and about 207,000 tons in 1937. Secretary of Commerce Sawyer implied that controls would have been allowed to lapse on June 30, 1949, had it not been for the work stoppages in Bolivia.

Federal controls over antimony were not renewed by Congress. They expired on June 30, thus ending federal regulation over this metal.

50 YEARS AGO

THE IRON AGE, *July 6, 1899*

• "The Bessemer works of Illinois Steel Co. at South Chicago were built according to designs prepared by Robert Forsyth in 1880. They were completed and made their first blow on June 14; 1882, since which time they have been in practically continuous operation."

• **"The Bethlehem Steel Co. announces that they are now prepared to furnish steel castings to the trade."**

• "The report of the coinage at the U. S. Mint in Philadelphia for the fiscal year ended June 30, 1899, shows the value to be $60,794,401, of which amount $49,919,180 was in gold."

• **"The two blast furnaces at Sharon owned by the Sharon Iron Co., Ltd., Sharon, Pa., were taken over by the National Steel Co."**

• "According to a customs circular of the India Office, hoop steel galvanized is assessed for duty on importation into British India at 1 pct ad valorem."

• **"Last week a number of orders were closed for machinery to be used in the new furnace and steel plant which is being built by the Japanese government."**

• "The predicted shortage in pig iron is beginning to be felt, particularly in foundry irons in the West. Instances are coming to light of foundries being obliged to shut down for several days awaiting receipts of needed raw material."

• **"We have received from Paris a series of photographs of wash drawings which furnish a good conception of some of the principal features of the Paris Exposition, which is to be held next year."**

• "There is one danger to establishments of moderate size in the concentration of power in the hands of consolidations which has not been dwelt upon and that grows out of the possibility of special rates of freight."

Manufacturing Large Mill Bearings Requires Use Of Special Machines

IN THE MANUFACTURE *of large mill bearings it is essential to use materials that can be heat treated to a high hardness and which will also resist the crushing strength imposed during operating conditions. Tapping a heat (right) of electric furnace steel at Timken Steel & Tube Div. After the bearing parts have been forged they are spheroidized to facilitate the subsequent machining operations.*

SEQUENCE OF OPERATIONS (*above*) *in the manufacture of bearings are, left to right: Green-machining a large mill bearing cup; grinding the outside diameter of a double mill bearing cone and finish grinding the face or end of a double cup.*

FINAL INSPECTION *and measuring (right) of a completed mill bearing. Timken engineers have developed special squipment for measuring the taper, or angle of taper on master tools which are used in the inspection department. Surface finish is measured by means of the Profilograph, an instrument which measures surface irregularities to the millionth of an inch.*

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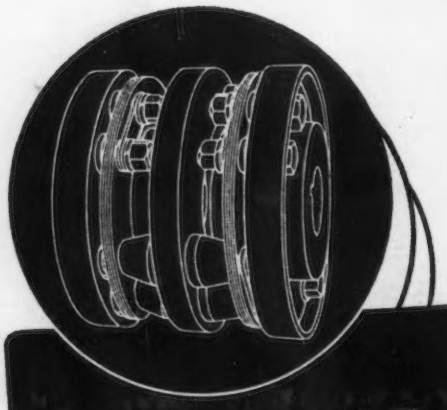
Flexible COUPLINGS

....are specified by engineers, wherever 100% Operating Efficiency is demanded



TYPE DBZ

TYPE DSM

TYPE CM

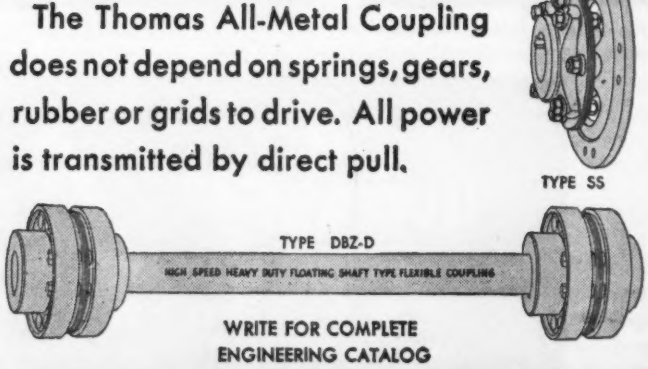
TYPE ST

TYPE AM

TYPE SS

THOMAS *Flexible* **COUPLINGS**
provide for
Angular and Parallel Misalignment as well as Free End Float...
and Eliminate
BACKLASH, FRICTION, WEAR and CROSS-PULL
NO LUBRICATION IS REQUIRED!

The Thomas All-Metal Coupling does not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.



WRITE FOR COMPLETE ENGINEERING CATALOG

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

Construction Steel

New York

• • • **The estimated total** bookings of fabricated structural steel for May totaled 115,903 tons, according to reports received by the American Institute of Steel Construction, Inc., an increase of 17.5 pct over the bookings for the preceding month. Bookings for the first 5 months of 1949 totaled 602,793 tons, about 25 pct less than the bookings for the corresponding months in 1948, but 7 pct greater than the average bookings for the same months in the 5 prewar years 1936/1940.

May shipments amounted to 167,976 tons. Shipments for the 5 months totaled 831,542 tons as compared with 808,550 tons for the same months of last year.

The backlog (tonnage available for future fabrication) for the next 4 months only amounts to 599,499 tons.

The tabulation of bookings and shipments for the 5 months is as follows:

	Estimated Total Tonnage for the Entire Industry		
Contracts Closed	1949	1948	Avg. 1936-1940
Jan.	130,418	160,634	107,578
Feb.	108,764	130,119	96,280
Mar.	149,079	213,123	124,558
Apr.	98,629*	154,082	110,783
May	115,903	141,764	126,237
Totals	602,793	799,722	565,436
Shipments			
Jan.	152,746	146,363	92,578
Feb.	145,879	141,556	88,626
Mar.	185,885	167,029	115,031
Apr.	179,056*	166,687	123,650
May	167,976	186,915	123,225
Totals	831,542	808,550	543,110
Tonnage available for fabrication within the next 4 months	599,499	593,380	337,237

*Revised.

• • • **Fabricated steel awards** this week included the following:

510 Tons, Bremer Co., Iowa, state highway bridge F88-5 to Clinton Bridge Co., Clinton, Iowa.

320 Tons, Benson, Ariz., bridge across San Pedro River near Benson, through Martin Contracting Co., Tucson, to Allison Steel Mfg. Co., Phoenix.

220 Tons, North Tonawanda, N. Y., addition to International Paper Co. plant, to Bethlehem Steel Co., Bethlehem, Pa.; Balling Bros., Tonawanda, general contractor.

210 Tons, Thief River Falls, Minn., state highway bridge 6613 to Bethlehem Steel Co., Inc.

170 Tons, Page Co., Iowa, state highway bridge F433-2 to Pittsburgh-Des Moines Steel Co., Des Moines.

140 Tons, Green Co., Iowa, state highway bridge S1267-1 to Pittsburgh-Des Moines Steel Co., Des Moines.

132 Tons, Thurston Co., Nebr., state highway

bridge F321-3 to Capital Bridge Co., Lincoln, Nebr.

110 **Tons,** Chicago, warehouse and office building for Fairbanks-Morse Co., to J. T. Ryerson & Sons, Chicago.

• • • **Fabricated steel inquiries** this week included the following:

600 **Tons,** Kansas City, Kans., Colgate-Palmolive-Peet building; S. Patti Co., contractor, Kansas City.

330 **Tons,** Cumberland Co., Ill., state highway bridge FX-VF; American Bridge Co., low bidder.

190 **Tons,** Loveland, Colo., U. S. Bureau of Reclamation Spec. 2646 substation; Electrical Contractors of Los Angeles, low bidder.

• • • **Reinforcing bar awards** this week included the following:

260 **Tons,** Minneapolis, state highway bridge 5591 through W. D. Giertsen Co., Minneapolis, to Paper Colmenson Co., St. Paul.

205 **Tons,** Waupum, Wis., hospital building through Hunter Construction Co., Fond du Lac, to Ceco Steel Products Co., Chicago.

179 **Tons,** Chicago, housing project site No. 5 to George Sollitt Construction Co., Chicago.

175 **Tons,** Elgin, Ill., National St. bridge to Illinois Hydraulic Construction Co., Elgin, to Bethlehem Steel Co., Inc., Bethlehem.

130 **Tons,** Odair, Wash., highway construction, S.S.H. No. 2-F, Odair to Electric City, through Peter Kiewit Sons' Co. to Bethlehem Pacific Coast Steel Corp., Seattle.

115 **Tons,** Mill Creek, Ind., Cagles Mill reservoir through Midland Constructors Co., Chicago, to U. S. Steel Supply Co., Chicago.

• • • **Railroad car awards and inquiries** this week included the following:

General American Transportation Co. will build 100 tank cars of 10,000 gal capacity.

National Gypsum Shelves Proposed Expansion Plans

Buffalo

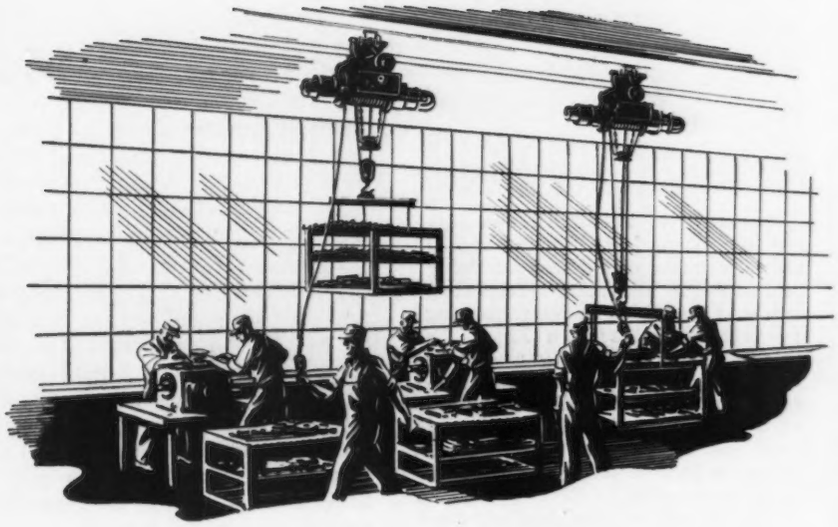
• • • **The National** Gypsum Co. has shelved its proposed long-range expansion plans for the time being to concentrate on "putting our present expanded facilities in the best competitive position," President Melvin H. Baker said, in announcing that his company has reduced its staff of productive labor and is preparing for a sizable cut in salaried personnel. The company has spent $36 million for expansion since the end of the war.

Mr. Baker did not specify the number of workers affected, but said the reductions will lower the corporation's payrolls by about $25,000 monthly. The total payroll for 1948 was nearly $17 million.

Sales for the first 6 months of the year were about 15 pct under the record volume for the same period of 1948, but turned upward in June, Mr. Baker said. He added that sales still are more than double the prewar rate.

He saw no evidence of a depression in the economic structure.

BREAK ASSEMBLY LINE BOTTLENECKS BEFORE THEY FORM



Be sure there is enough lift power and speed to feed parts or sub-assemblies to the main line at the correct tempo.

Will your need be for overhead cranes? What capacity? Or hoists? How large? How operated? From cabs—or from the floor with pendant controls?

The man best qualified to help you answer these queries is the Shepard Niles specialist. He has reference data to cover the performance of all three—and his mind is unprejudiced because he has sold all three for years. Let him help you plan!

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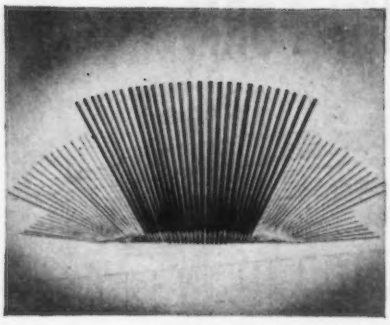
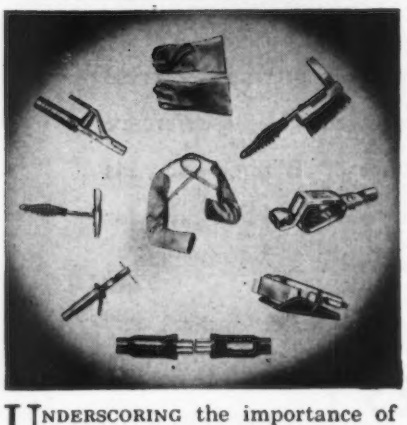


DESCRIPTIVE literature covering mild steel, low alloy and special steel, stainless steel, hard surfacing and build up and other special electrodes is available to those requesting full information on M & T's "SELECT 70"— seventy electrodes designed to cover all arc welding requirements—AC or DC, all-position or downhand work welding of mild steel, low alloys and stainless steels as well as hard surfacing and building up of worn parts.

Literature is brief but comprehensive, covering specifications, properties and applications for each electrode. Copies available on request received on company letterhead. Address Metal and Thermit Corporation, 120 Broadway, New York 5, N. Y.

ACCESSORY DIVIDENDS DECLARED



UNDERSCORING the importance of proper accessories to top welding performance, more and more fabricators are taking pains with selection of accessories. Speedier, lower cost, safer and improved welding are assured when such items as helmets, shields, holders, connectors, cleaning tools and protective clothing are carefully selected. And more and more fabricators—sold on M & T electrode and arc welder performance — are specifying the M & T line of "accessories to the perfect weld." For descriptive literature, address Metal and Thermit Corporation, 120 Broadway, New York 5, N. Y.

Study Shows Rising Accident Trend in Lake Superior Mining Area

Washington

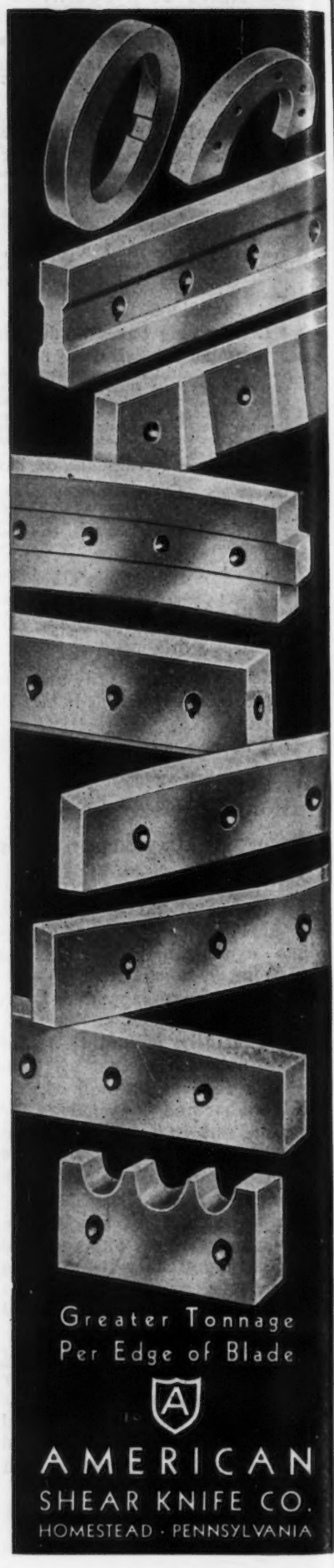
• • • **Management and labor** are advised to work together to check the rising accident trend in the Lake Superior District iron-ore mines in a recent Bureau of Mines publication reviewing the 1940-47 accident experience in the nation's chief iron-ore producing region.

Although the safety record of the district, where 122 open-pit and underground mines produce 85 pct of the country's iron ore, was better for the 8-year period than in other metal-mining districts, according to the study, the frequency rate is climbing and unless halted, may lead to a rise in the severity rate. The frequency rate is the number of lost time injuries per million man-hr worked, and the severity rate means the number of days lost because of injuries per thousand man - hr worked.

Increased production and replacement of men entering the armed services in the 1940-45 period by men with less experience, and the reentering of the mines by many men released from war service during 1946 and 1947 had, and continues to have, "a definite effect on the number of injuries in the mines," according to the report prepared by Frank E. Cash, bureau supervising engineer at Duluth.

The report includes a comparison of accident frequency and severity in the mines of the Lake Superior district with those metal mines entered in the National Safety Competition and totals for the United States, analyses of accidents by causes and types of operations, and a listing of accidents over the 8-year period. It also briefly summarizes safety practices, employee training programs and operating practices observed at mines in the area and an appendix explaining methods used in calculating accident trends.

Free copies of Information Circular 7510, "Accident Experience Iron-Ore Mines, Lake Superior District 1940-47," may be obtained by writing to the Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.



ASM Plans Analysis On Methods, Results Of Teaching Metallurgy

Cleveland

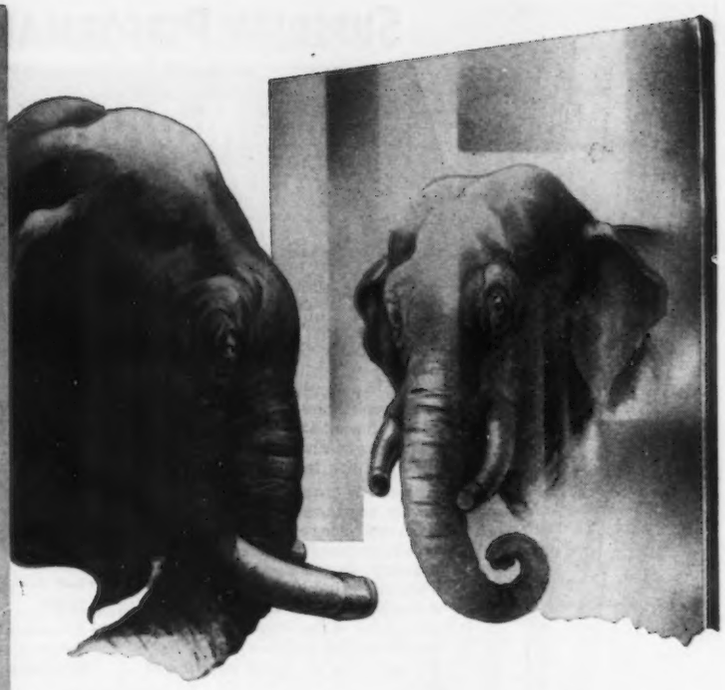
• • • **American Society** for Metals has announced a new committee to examine and make available constructive analysis on methods and results of teaching process metallurgy in technical schools and colleges.

According to W. H. Eisenman, the society's national secretary, the committee will function as a part of the ASM Advisory Committee for Metallurgical Education, the latter standing committee under the chairmanship of Professor A. R. Troiano, University of Notre Dame.

The chairman of the new group, known as the subcommittee on process metallurgy, is R. Schuhmann, Jr., professor of metallurgy, Massachusetts Institute of Technology. Assisting Professor Schuhmann will be Professor J. Gregg, Department of Metallurgy, Cornell University; Professor T. L. Joseph, assistant dean, Institute of Technology, University of Minnesota; Professor H. H. Kellogg, School of Mines, Columbia University; Professor E. A. Peretti, Department of Metallury, University of Notre Dame; Professor W. O. Philbrook, Department of Metallurgical Engineering, Carnegie Institute of Technology; Professor L. M. Pidgeon, head, Department of Metallurgical Engineering, University of Toronto; Professor A. W. Schlecten, chairman, Department of Metallurgical Engineering, Missouri School of Mines & Metallurgy; and Professor J. P. Spielman, head, Department of Metallurgy, Montana School of Mines.

"The group of educators will reexamine present methods of teaching extractive metallurgy in both classroom and laboratory with the view of bringing these methods into step with the modern advances in physical chemistry and other allied sciences," Professor Troiano said.

"Professor Schuhmann, who has made notable contributions to the field, suggests a clue as to the effective work the subcommittee will do, in his recent paper, 'The Unit Processes of Chemical Metallurgy'. In this paper, Professor Schuh-



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Thick enough to withstand the attacks of its enemies

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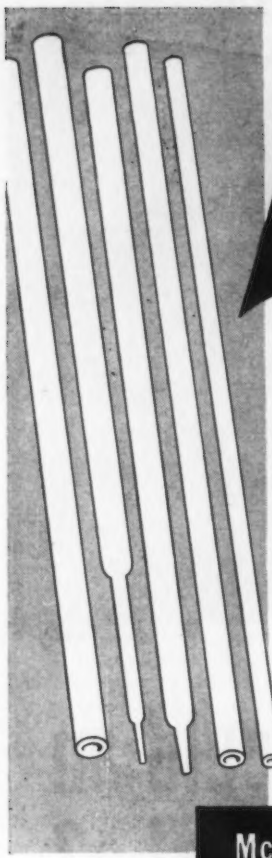

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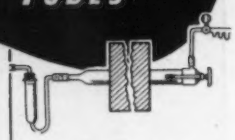
with McDANEL HIGH TEMPERATURE COMBUSTION TUBES



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Superior performance—and lower replacement costs—are assured! Here is what leading metallurgists in the steel industry say about McDanel Tubes: "Highly satisfactory in every respect"—"Take temperature rises and drops exceptionally well"—"Give better service as well as longer life."

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- Refractory Porcelain Specialties in stock or designed to meet your needs.

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mann presents a new and general classification of metallurgical processes. The subcommittee will thoroughly explore the opportunities for extending further this idea of orderly practice into the teaching of process metallurgy," he further stated.

Shows Taxes Equal To 25 Pct Cost of a Car

Detroit

• • • **About one fourth** of the total cost of your automobile is taxes, according to J. R. Davis, vice-president—Sales and Advertising, Ford Motor Co.

Addressing the Michigan Automobile Dealers Assn. here recently, Mr. Davis said, the direct and indirect taxes on a $2000 car amount to approximately $500.

Mr. Davis listed the following tax components on the Detroit delivered price of a $2000 car:

Income Tax on Manufacturer	$90.00
Unemployment Taxes	12.00
Transportation Tax	2.50
Excise Taxes	95.50
Sales Tax, Vehicle	43.00
Sales & Use Tax on Supplies	2.50
License Plates & Title	12.00
Dealer Income Tax	157.00
Dealer Personal & Property Taxes	80.00
Other Dealership Taxes	17.00
TOTAL	$511.50

Mr. Davis asserted that the 25 pct estimate is undoubtedly an understatement of the real tax components of an automobile since a number of taxes could not be figured accurately enough to be included in the compilation.

The present American tax structure is an important factor contributing to the unlikelihood of any manufacturer's producing a $1000 car, Mr. Davis asserted.

Dynaflow Units Popular

Flint

• • • **Within the brief** space of 15 months, Buick has produced more than 200,000 of its new Dynaflow Drive transmissions, attesting to the popularity of clutchless driving.

At the present time Buick is turning out more than 1200 transmission units daily.

The company reports trouble-free performance for thousands of Buick owners whose cars are equipped with the new Dynaflow transmission units.

Large Backlogs In Structural Industry Taking Up Decline

New York

• • • **Heavy backlogs** in the structural steel fabricating industry are taking up much of the slack in decline business. This was brought out at the annual engineering conference of the American Institute of Steel Construction held here recently.

Seventy-five structural steel engineers from the U. S. and Canada attended the meeting. Of these, 60 were chief engineers from fabricating companies and the remaining 15 were district engineers of the institute's staff.

L. Abbett Post, executive vice-president, summed up reports of district engineers by pointing out that construction of schools, churches, hospitals, and other types of public and semipublic building is now going ahead at any accelerated rate. But commercial and industrial building in most sections is experiencing some letup.

The steel shortage which held up hundreds of major projects since the war has been completely reversed in the past 2 or 3 months, he said, and today structural steel is generally available for quick delivery. Large-scale housing developments are holding their own and designers of all types of buildings using structural steel are busy.

Regional reports from district engineers included the following:

NEW ENGLAND AND NEW YORK STATE: Present construction volume is mainly for schools, hospitals, commercial buildings and housing developments. Although industrial construction has dropped off considerably, many industries are finding it imperative to make considerable alterations calling for structural steel, to reduce production costs of their products. Bridge construction in this area will require considerable tonnage.

CHICAGO: Many projects previously withheld because of retarded completion schedules are now going ahead, with a plentiful steel supply. Many schedules are being readjusted. Some decrease is apparent in industrial building demand.

ST. LOUIS: General construction outlook is good. There has been a slowing down in volume and reduction in size of contracts, but a noticeable increase in the number of bidders on individual projects. This increased competition has resulted in a closer range of bids and a nominal to small reduction in construction costs. The peak of costs has passed. Principal demand is for public buildings, schools, hospitals and churches. Commercial and industrial buildings are few. Highway bridge work has stepped up in volume.

The overall picture of steel deliveries to fabri-

Handling conditions vary for each particular plant. Your own problem should be presented to an experienced material handling engineer. However, the following example outlines a simple method for determining the savings possible with an electric industrial truck. Let us assume a hypothetical plant with the simple problem of transporting daily 180 tons of material 200 feet from stockrooms to processing machines. Without power trucks this would require 10 truckers, each making 10 round trips per hour, or 80 trips per day, carrying 450 lbs. of material per load.

TABLE I—*Handling Costs Without Electric Truck*

Based on 180 tons per day	*Cost per day*	*Cost per ton*
Labor (85¢ per hour)	$68.00	$0.378
Social Security Taxes	2.72	0.015
Workmen's Compensation	1.00	0.006
Hand Truck Depreciation	0.30	0.002
Total	$72.02	$0.401

In order to mechanize handling operations, the following equipment would be required:

TABLE II—*Cost of Equipment for Mechanizing*

Fork Lift Truck 2000-lb. capacity	$4,100.00
Battery	600.00
Charging Equipment	840.00
200 pallets	700.00
Total	$6,240.00

The truck, handling one-ton pallet loads of material, making 24 round trips per hour, could transport the 180 tons in 7½ hours.

TABLE III—*Annual Expense—Truck Operation*

Depreciation—Truck at 10%	$410.00
Battery at 20%	120.00
Charging equipment at 6⅔%	56.00
Pallets at 20%	140.00
Tires	100.00
Repair and Maintenance—Truck	164.00
Battery	24.00
Charging Equipment	33.60
Replacement of damaged pallets	70.00
Electricity	82.00
Insurance	10.00
Total annual expense	$1,209.60
Expense per day	4.03

TABLE IV—*Handling Costs—With Electric Truck*

Based on 180 tons per day	*Cost per day*	*Cost per ton*
Labor (Driver—$1 per hour)	$8.00	$0.044
Social Security Taxes	0.32	0.002
Workmen's Compensation	0.16	0.001
Truck Expense	4.03	0.022
Total	$12.51	$0.069

TABLE V—*Savings With Electric Truck*

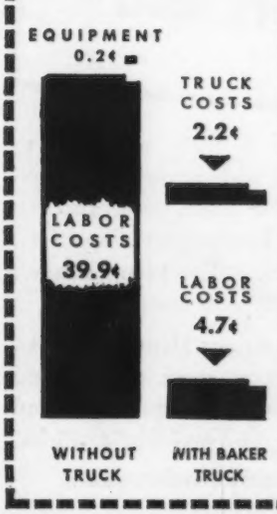
Savings Per Ton	$ 0.332
Savings Per Day (Handling 180 tons)	59.51
Savings Per Year (300 days)	17,853.00
Per Cent Reduction in handling costs	83%
Annual earnings on investment	286%

While this example is obviously oversimplified, Baker Material Handling Engineers are prepared to show you how similar savings can be made on handling operations in your plant.

COST OF MATERIAL HANDLING

Per ton—based on 180 tons per day

In addition to these savings, Baker Trucks reduce warehouse rental charges by tiering, contribute to plant safety, speed production and material movement, and perform many other operations that reduce plant overhead.



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In Canada: Railway and Power Engineering Corporation, Ltd.

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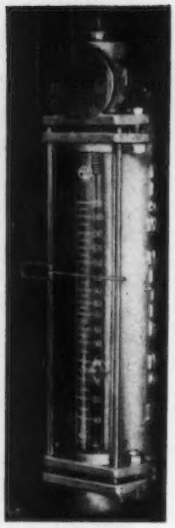

A visual, continuous indication of flow rate is provided by A.G.F. Flow Meters. Rate of flow is read directly in cubic feet per hour. Any change or interruption in the flow is immediately evident. Units are available for practically all gases used in industry, and many liquids. Gas capacities range from 1/4 to 3000 cubic feet per hour.

A.G.F. Flow Meters give an accurate, dependable reading at all times and insure uniform results by permitting duplication of previously determined settings. The patented alloy center-wire construction keeps the float permanently centered in the glass tube, and helps to damp oscillations resulting from minor variations of flow or pressure.

Many applications—A.G.F. Flow Meters are used for the measurement of the flow of atmosphere gases of all kinds, including carburizing gases, ammonia flow in Nitriding, hydrogen flow; and measurement of the flow of fuel gases, including city gas, natural gases, bottled gases such as butane and propane, and mixtures of gas and air.

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"Shur-Site" Treads and
Armorgrids

cators has changed drastically. Mills are now booking orders for delivery in 30 to 60 days. Designing offices are all very busy and in most cases have backlogs of 6 to 8 months' work. Stadium and auditorium construction is getting increased attention. Most companies are proceeding with caution and are not overly optimistic.

TEXAS: A general slowing down in the early part of the year was followed by a record month for construction awards in April. The next few months should be good. Competition has become more keen. This has brought preliminary designs from the shelves and many jobs are now in final design stages. The government's Los Alamos project has been letting about a million dollar's worth of work a day. Steel fabricators have good volume, and while not overly optimistic are not worried.

LOS ANGELES: While the volume of structural steel work is higher than before the war, there are more participants. Effect of increased capacities established during and since the war is being felt. Demand is coming largely from public works, schools and bridges. Industrial work is very meager. The general feeling is optimistic—that we are in a healthier condition and by fall will feel increased demand from private investors.

Mahoning Valley Technical Societies Council Elects

Youngstown

• • • **A. L. Thurman,** engineer for Aetna-Standard Engineering Co., has been elected president of the newly organized Mahoning Valley Technical Societies Council. Other officers are: I. O. Oehler, vice-president, E. J. P. Fisher, secretary and H. R. Carle, treasurer.

Mr. Thurman appointed H. F. Bott chairman of the program coordination committee and S. E. Babcock chairman of the publications committee.

The council was recently organized by representatives of Mahoning and Shenango Valleys technical societies to coordinate activities of the technical, scientific, architectural and engineering organizations. Member organizations are: Sharon section, American Institute of Electrical Engineers; Youngstown section, American Society of Mechanical Engineers; Mahoning Valley chapter, and Warren, Ohio chapter, American Society for Metals; Mahoning Valley section, American Welding Society and Mahoning Valley Society of Professional Engineers.

Board of governors include: H. F. Bott and A. J. Maslin (AIEE); S. E. Babcock and A. L. Thurman, (ASME); E. J. P. Fisher and H. H. Johnson, (ASM-Mahoning); R F. Lab and H. Ohl (ASM-Warren); I. A. Oehler and W. Scott, (AWS); H. R. Carle, C. V. Long (MVSPE).

Pressed Metal Institute Schedules Convention

Cleveland

• • • **Problems and policies** in a changing market will be the theme of the annual convention of the Pressed Metal Institute here July 20-22. Convention headquarters will be in the Cleveland Hotel.

Technical and educational meetings are set up for all daytime sessions. Qualified experts in their respective fields will deliver two luncheon addresses, while the morning and afternoon sessions not given over to the formal business of the institute will be devoted to informative discussions of current operating problems.

Guests of the convention will be a visiting stamping productivity team from England. This group of 16 will arrive in the U. S. July 5 for a 30-day itinerary of some 20 plants in a dozen cities from New England through Ohio to Michigan. One week of their visit will be spent in Cleveland for plant visits and convention participation.

Opening session of the convention will be a conducted tour of the Republic Steel Corp.'s sheet and strip mill here, scheduled for the afternoon of July 20.

A formal business session will open the morning program July 21 at which the annual business of the institute is scheduled for discussion. This meeting will undertake a revision of the constitution of the group, will hear reports from officers and the managing director, and will elect members of the board for the coming year.

At noon, A. T. Colwell, vice-president, Thompson Products, Inc., will discuss jet engines and jet propulsion.

The afternoon's technical discussion will be presented by the Toledo District of Pressed Metal Institute. Four leaders from the technical side of industry will speak. Speakers and their subjects are: Ray Peterson, Peterson Engineering Co., "How the Schools Can Aid in the Training of Die Engineer Personnel"; George Lober, Superior Spinning & Stamping Co., "How the Metal Spinners Work with Stamping Companies"; Homer Percival, Acklin Stamping Co., "Recognizing Seniority and Job Preference in a Stamping Shop"; and

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Next time your supplier calls ask him for a free copy of Star's booklet, "Metal Cutting", and the new Star Wall Chart. Both are packed full of valuable information on the selection, use and care of hack saw equipment.

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Makers of hand and power hack saw blades, frames, metal cutting band saw blades and the Clemson Lawn Machine.

William VonBehren, Swartzbaugh Mfg. Co., "History of a Government Job" and "Rectangular Deep Draws in Aluminum."

On Friday, July 22, speakers will include: Oliver F. Fancey, Washington representative of the institute; Eugene Schwartz, labor relations consultant to the institute, and Robert Weaver, Jr., a member of the Small Business Advisory Committee to the Secretary of Commerce.

Lincoln Electric Plans Construction New Plant

Cleveland

• • • **James F. Lincoln,** president, The Lincoln Electric Co. announced recently that final arrangements have been completed with The Austin Co. of Cleveland for the immediate construction of an $8.5 million plant to be erected in Euclid, Ohio.

The one story manufacturing plant will contain over 850,000 sq ft of floor area on a 65 acre site. The new plant will be ready in 1950 for the transfer of all manufacturing operations from the present plant.

Mr. Lincoln, in announcing plans for the new plant said:

"We are going ahead with our plans at this time because we feel that arc welding, as a relative new comer to modern industry, has only scratched the surface in developing its potential contribution to the progress of all industry. More than ever, now, industry is turning to arc welding to find ways of reducing manufacturing costs while improving quality.

"In addition to its position in industry, welding is on its way towards becoming a universal tool for repairing and fabricating with metals. We are now manufacturing a welder for home use in repairing and building that operates off the regular light circuit as well as a welder for farm use on rural power lines. We believe that welding has a great future and the future belongs to those who prepare for it."

The entire plant has been designed to reduce materials handling cost to a minimum. Plant and handling equipment are integrated so that movement of all goods is always to the point of next use.

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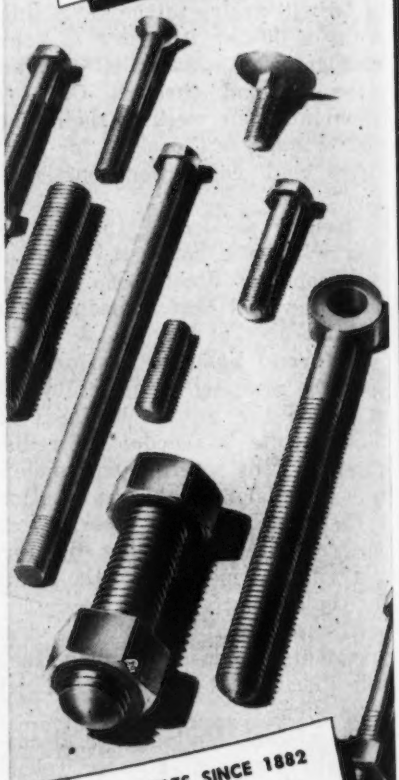

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Moving Stairways Are Gaining in Popularity Manufacturers Report

Pittsburgh

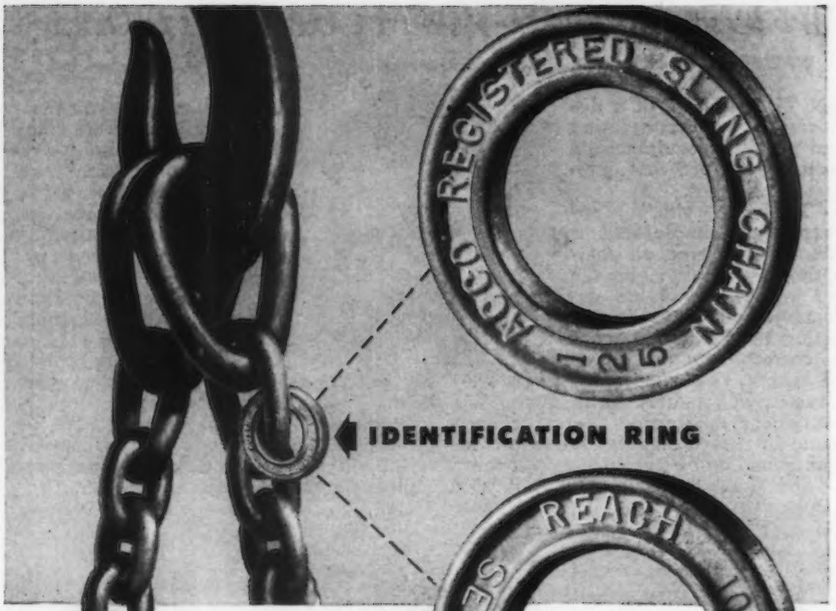
• • • **Moving stairways** are getting more popular, judging from recent reports of installations made by Westinghouse Electric Corp. here, and Otis Elevator Co., New York. One of the latest Westinghouse units is in the 3-story United Engineering & Foundry building here. Another, involving 16 stairways in a Boston life insurance building, replaces 25 elevators. The Navy is installing moving stairs on aircraft carriers to bring jet pilots and their 40 lb of equipment from ready rooms to the flight decks.

Economics spark the new trend. For one thing, moving stairs require no operators. Secondly they handle crowds quickly. The John Hancock Mutual Life Insurance building in Boston has 16 electric stairways connecting the first eight floors. At the end of the day they are all switched to "down" and can move 5000 people to the street floor in 15 min. If elevators served these eight floors instead of stairways, 25 would be needed. Initial cost of the elevators would be 50 pct higher and maintenance expense would be doubled.

On the West Coast a bank uses two electric stairways, an elevator and a foot-power stairway to connect its main second floor banking room with the street below. About 95 pct of all visitors prefer the electric stairway, Westinghouse officials claim.

Otis Elevator Co., which pioneered the moving stairway, calls its product an "Escalator." It has recently been awarded the contract to furnish Escalators for the United Nations building. Kaufmann's, Pittsburgh department store, probably has more of this type transportation than any building in the world—66 escalators.

Standard speed is 90 fpm; standard rise is 30°. For the statistically minded, the 16 stairways in the John Hancock building will, when fully loaded, impose a 368-ton load on the building. The steel trusses alone weigh more than 72 tons.



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SEND for this catalog which contains information on how to select, use and care for sling chains. It is DH-80.

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In Business for Your Safety

"What's so good about H-VW-M COMPOSITIONS?"

WALTER R. LOCKWOOD • Field Representative • H-VW-M, Anderson, Ind.

IN THE MIDST of a discussion on electroplating and polishing equipment, a customer popped that question at me.

"To begin with," I answered, "profitable buffing operations depend on compositions exactly right for the job. H-VW-M has devoted years of research and testing to the development of correct compositions of all grades . . . a complete line in a variety of job-fitted forms, for convenient application (hand or automatic in bar or liquid) and to provide maximum buffing efficiency and economy.

"Specifically," I continued, "H-VW-M compositions give you these advantages: Adherence to the wheel as long as abrasive retains its cutting action; maximum color per degree of cut; clean working properties; easy solubility in cleaning solutions; more mileage per pound of composition used.

"And," I concluded, "if you have an unusual problem at any time, we'll be glad to survey your buffing conditions and recommend an economical solution."

Ask your H-VW-M representative, or write to "Headquarters"* for a copy of Bulletin BC-104. It describes our complete composition line.

*Hanson-Van Winkle-Munning has supplied the plating industry for over 70 years. Our sales-engineers are thoroughly familiar with every step in the process of electroplating and polishing. It is this overall knowledge that has made H-VW-M "Headquarters" for electroplating and polishing equipment, supplies and technical assistance.

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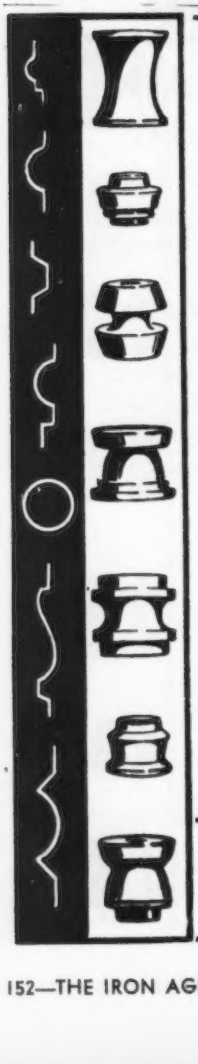

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United Opens New Offices

Pittsburgh

• • • **More than 4000 guests** attended the official opening of the new general offices of United Engineering & Foundry Co. on Duquesne Way here on June 10. The new 3-story building houses over 500 officials and employees of the company in a clean-lined modern building overlooking the Allegheny River.

The 130-ft granite and limestone front of the new structure is broken at the lower left to make an entrance to the building and to the company garages and parking lot. An unusual touch is provided by balconies running across the facade on the second and third floors.

The main offices have movable steel partitions, asphalt tile floors and acoustical ceilings with recessed fluorescent lighting. The building is air conditioned and its roof is covered in summer with about an inch of well water. Each floor has about 16,300 sq ft of floor space. Access to the upper floors is by Westinghouse moving stairways though there is also a freight elevator and dumb waiters.

Canadian Production Primary Iron, Steel Shapes Up for March

Toronto

• • • **Canadian production** of primary iron and steel shapes for the month of March 1949 totaled 354,527 net tons as compared with 300,916 tons in February and 302,902 tons in March 1948. Output for March included 342,194 tons of carbon steel shapes and 12,333 tons of alloy steel shapes. In the production figures for March are included 106,199 tons of shapes shipped to producers' own plants or plants within the primary industry for further processing.

Shipments for sale of primary iron and steel shapes in March amounted to 262,408 net tons, of which 250,279 tons were carbon steel shapes and 12,234 tons alloy steel shapes; in February shipments totaled 216,862 tons and included 207,868 tons of carbon and 8994 tons of alloy steel shapes, and for March 1948, shipments

amounted to 226,748 tons and included 210,106 tons of carbon and 16,642 tons of alloy steel shapes. The above figures, which show iron and steel shapes for sale, do not include deliveries for further processing.

The following table shows production and shipments for sale of primary iron and steel shapes for the month of March in net tons:

Item	CARBON STEEL Made	CARBON STEEL Shipped	ALLOY STEEL Made	ALLOY STEEL Shipped
Billets, etc., for forging	8,603	5,610	1,780	1,754
Other semifinished shapes, not for rerolling by makers	48,533	3,168	824	....
Structural shapes and piling	18,214	14,788	....	....
Plates	18,448	19,494	100	174
Rails	28,769	27,332	....	....
Tie plates and track material—				
Splice bars	3,864	2,152	....	....
Tie plates	3,719	3,795	....	....
Spikes	939	920	....	....
Concrete reinforcing bars	6,296	6,966	....	....
Hot-rolled bars for cold finishing	1,506	....	....	....
Other hot-rolled bars	53,804	49,495	7,343	8,111
Pipes and tubes	21,215	20,757	....	....
Wire rods	25,812	26,197	45	44
Hot-rolled black sheets	26,142	21,422	....	....
Cold-reduced black sheets	9,055	5,568	....	....
Galvanized sheets	8,788	9,961	....	....
Steel castings	8,877	8,507	1,646	1,640
Miscellaneous hot-rolled products	29,253	4,074	298	258
All other products	20,357	20,073	297	253
Total	342,194	250,279	12,333	12,234

Producers' shipments of primary iron and steel shapes subdivided according to principal consuming industries for the month of March, in net tons, follow:

Consumer	Carbon Steel	Alloy Steel
Automotive industries	9,770	7,614
Agricultural, including farm machinery	14,346	45
Building construction	34,255	35
Containers industry	19,162	3
Machinery and tools	11,727	447
Merchant trade products	34,304	92
Mining, lumbering, etc.	6,309	630
National defense	13	3
Pressing, forming and stamping	11,059	98
Public works and utilities	1,787	58
Railway operating	37,752	349
Railway cars and locomotives	19,492	323
Shipbuilding	3,298	51
Miscellaneous and unclassified	1,176	125
Wholesalers and warehouses	30,567	317
Direct export:		
(a) to British Empire	239	1,147
(b) to other countries	15,023	897
Total shipped for sale	250,279	12,234
Producers' interchange	105,375	824

Man-handling is Outmoded

Logan Roller Conveyor Storage Racks, in nut and bolt manufacturing plant. Heavy tote pans are moved to and from storage via transporter car in center. Car has upper and lower decks consisting of Roller Conveyor sections.

"Let George do it" has been superseded by "Do it with conveyors."
Through every stage of production, Logan Conveyors release workers from slow, costly man-handling . . . free them for productive tasks. And in addition to time and effort economies, Logan equipment permits the use of more square feet of valuable floor space. There are Logan Conveyors for small nuts and bolts, for massive coils of steel, and everything in between. A wide variety of products move on these dependable carriers to meet exacting shop schedules.
Now, as the nation enters an era of keener competition, is the time to conveyorize. Write today for Logan literature or for the nearest Logan engineer to call, no obligation.

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From hairpins to harrows—no matter how small or how large—your problem of handling parts through heat-treating, quenching, pickling, washing, degreasing or bright dipping will be solved through Stanwood's correct design. Stanwood engineers, capable, always ready to serve, will correctly design a basket most suitable for your parts, assuring maximum production.

Stanwood manufactures all types and sizes of trays, fixtures, retorts, carburizing boxes. Consult the Stanwood representative in your area today! Send for Catalog 16.

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New York and San Francisco

Carnegie Tech Professor To Be a Guest in Brazil

Pittsburgh

• • • **Dr. Robert F. Mehl,** director of the metals research laboratory and head of the metallurgical engineering department at Carnegie Institute of Technology, will be a guest at the 50th anniversary of the Research Institute of the State of Sao Paulo, Brazil.

Dr. Mehl, who lectured in the South American nation in 1943 at the request of Nelson A. Rockefeller, Coordinator of Inter-American Affairs, will also attend the fifth anniversary of the Brazilian Society of Metals, which he helped organize.

The recipient of an honorary doctor's degree from the University of Sao Paulo, Dr. Mehl is a permanent member of the faculty there. During his last visit to Sao Paulo, sometimes called the Pittsburgh of South America, he lectured to industrialists and students on American metallurgical knowledge and practices.

Lifts Restrictions On Canadian Scrap Iron

Seattle

• • • **With the lifting** of export restrictions on Canadian scrap another source is open to local steel producers. Already two cars of this material have been delivered to Bethlehem Pacific Coast Steel Corp. here and it reportedly is of good quality.

Introduction of this material has not affected the prevailing price for No. 1 heavy here which remains at $17.00 per ton f.o.b. shipping point which actually means approximately $20.00 per ton at the furnace.

Scrap is again moving in spite of some seller's earlier claims that they wouldn't dispose of their inventories at present prices. However, the market is not too large just now with Northwest Steel Rolling Mills out on strike, Pacific Car & Foundry with a large inventory and Isaacson Iron Works out of the steel production picture.

Western steel buyers are interested in the offerings being made by Canadian producers of rails, ingots, slabs, blooms, billets, pig iron and cast iron soil pipe. Tin-

(CONTINUED ON PAGE 174)

EUROPEAN LETTER

(CONTINUED FROM PAGE 126)

It is to the interest of the Dutch to come to terms quickly with the government of Soekarno and Hatta because this government, whatever its origin in pro-Japanese collaboration, represents the hitherto effective leadership of the nationalist movement; and the only alternative to it now, if it is either suppressed or driven to accept humiliating terms, will be Communist leadership. This government has already shown its will and ability to crush Communist revolt, and has the merit of being denounced by the organs of international Communist propaganda. The Dutch should realize that they can no longer, as before 1941, govern Indonesia with a handful of troops, against the will of that educated class which their own schools and universities have created, and that no puppets whom they may set up can help them if their own strength is not sufficient. Indonesian leaders, to have general Indonesian support, must be able to show the substance of independence as a result of their policies; only so can they obtain acceptance for measures giving the Dutch the special position of influence and friendship which would be constitutionally expressed in some form of commonwealth relation with the Netherlands.

BOTH for the Dutch themselves and for their partners in Western Union and the Atlantic Pact it is of the greatest importance that the military strength of the Netherlands, which is in any case very limited, should not continue to be frittered away in attempts to control by force a vast area thousands of miles from Europe with a population ten times that of the metropolitan country and irrevocably aroused out of its former docility. There is here a special problem of Anglo-Dutch relations, and it is one that urgently needs a new understanding on both sides for the attainment of a genuine cooperation between the two nations. The bitterness of feeling in the Netherlands has cast a shadow over the comradeship in arms which was so real and so promising for the future during the years of the war. To get rid of this ill-feeling which has been poisoning Anglo-Dutch relations it is certainly necessary that there should be a frank recognition of responsibility for what happened in Indonesia in 1945.

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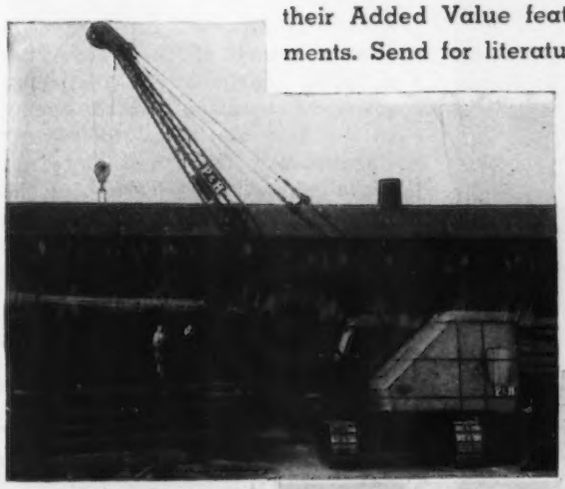

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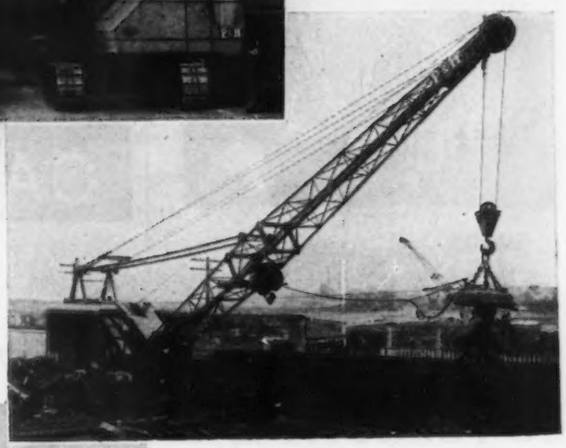
P&H Crawler Cranes are easy to operate because of P&H's smooth, responsive hydraulic control. You can operate them in close quarters because of P&H's exclusive and simplified method of steering and braking.



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Equipped with magnet, the P&H Crawler Crane loads scrap quickly. For those countless lifting jobs in plant yards, you can make no better choice than a P&H. Its construction of rolled alloy steels means extra long, trouble-free service.

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There's a P&H Industrial Crawler Crane to Meet Your Requirements. Write Today for Bulletins!

Impenetrable mystery still surrounds the vital British policy decisions of September, 1945, on which the whole subsequent course of events turned. The decision to treat Soekarno, not as an enemy but as a friend, and to recognize his government as the *de facto* authority in Java, was taken before a single Allied soldier had landed there but where, when, how, why or on whose responsibility has never been divulged. It was contrary to the original directives of the Chiefs of Staff, to assurances repeatedly given to the Dutch, and to the principles followed by the Allies in Europe, which did not admit nationalist conviction as justifying active collaboration with the enemy in the case of Croats, Slovaks or Ukrainians. The Dutch were not consulted, and only learned of the repudiation of Britain's previous undertakings from a SEAC radio broadcast. Soekarno himself first heard of his happy prospects from the same source. Having been honored with the Japanese Order of the Sacred Treasure, Second Class, he arranged his affairs in anticipation of imprisonment on the arrival of allied troops. But, as a practical politician, he was ready to make the most of respectability when it was conferred on him, at the expense of the Dutch, by the authority of victorious Britain. Unfortunately, his inability in the early stages of his rule to control the wilder elements of his following, and the British omission to make the Japanese army responsible for the safe delivery of all Dutch and Eurasian civilian internees, led to the terrible atrocities committed against the internees by Japanese-trained Indonesian irregulars in the months following the end of the war.

ALL this is past history, and it may be said that it is best forgotten. But the Dutch have not forgotten it and find intolerable the airs of smug self-righteousness which British opinion is in the habit of giving itself over the whole Indonesian affair. It is only if there is a readiness on the British side to admit that serious mistakes were

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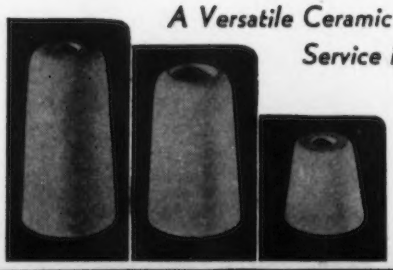

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CERAMICS DIVISION

made in 1945, and to express some regret for conduct which history will not be able to describe as honorable, that Britain can expect the Dutch to wipe the slate clean and start afresh in joint endeavor to deal with problems of policy both in Europe and in southeast Asia. For it is not the past with which Britain and the Netherlands have now to deal, but the future, and the course of future events will very greatly depend on the degree of mutual understanding and cooperation with which they can frame their policies in spheres where their interests overlap.

Even if Soekarno had not been able to establish himself as he did in 1945, the Dutch would have been faced with a formidable and growing nationalist movement in Java and Sumatra and would have had to take serious measures for coping with it, whether by repression or conciliation. Had events taken a different course, they would no doubt have been more ready than they have been to profit by the examples of British experience in relation to nationalist movements. As it is, they have now come to the point at which they seem more ready than before to make the concessions required if they are to come to terms with the Indonesian leaders. They have agreed that the Republican government should return to Jogjakarta and, after once withdrawing from the capital, it will hardly be possible, politically, to undertake a third police action if negotiations break down again. The Republican leadership, on the other hand, also appears to be in a more conciliatory mood than it was, for it has been made clear enough that further fighting can only ravage the country and transfer power on the Indonesian side to Communist hands. There is reason to hope that this time at any rate the negotiators will have the will to agree. There is a danger that any outside interference may do no more harm than good; but it will be well for friends to convey to both sides the urgent concern of all who desire a peaceful world that a free Indonesia should come into existence without detriment to the rightful interests of the Netherlands in a region where Dutch enterprise and administration have wrought the great historic work of creating a state out of the many kingdoms and tribes once scattered from Sumatra to New Guinea.

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MACHINE TOOLS

. . . News and Market Activities

Tool Builders Enter New Fields During Slow Market Periods

• • • **The heavily expanded** capacity of the machine tool industry and the typical boom-bust order cycle of the industry has caused many tool builders to enter new and unrelated fields to stabilize their business during off-peak tool markets.

Two builders, Warner & Swasey Co. and Barber-Colman Co., have entered the textile machinery field. Lodge & Shipley Co. is in the garden cultivator business. Ex-Cell-O Corp. holds basic patents on paper milk carton machinery. The Norton Co. is building bottle labeling machinery. Warner & Swasey is also building automatic trenching equipment. Cincinnati Milling Machine Co. is producing a metal cutting coolant and oil film bearings.

This trend is not a wholly new one. Long before the war some builders had entered new manufacturing fields. In some instances the move was a long term success. The National Acme Co. has been in the electrical products field for more than 10 years. Others have fallen by the wayside.

Many of the new lines are in the early stages of marketing. Others have had the advantage of pent-up demand and the abnormally high rate of business activity during the last few years. So far the new industrial lines have proved successful generally. Whether this will continue in the present highly competitive markets is yet to be seen.

There have been a good many problems confronting the builders entering the new fields. Marketing to a wholly different customer group has been a basic difficulty. It has taken considerable time to educate design engineers and sales engineers to meet the special problems of the new markets. The transition from the problems of heavy metal cutting machinery to those of equipment handling light textile fibers, for example, involves a complete reorientation in the thinking of management and engineering staff.

There is no necessity in many fields for the customary fine finish required for machine tools, nor for the close tolerances required for their component parts. Builders find that their engineers and designers have been generally specifying higher standards than needed for the operation of the new lines of products, which serves to build manufacturing costs needlessly.

One of the purposes in entering a new field is to take advantage of excessive productive capacity. It has been possible to utilize existing facilities in some cases by the addition of a few new pieces of equipment. But it has generally been necessary to set up wholly new production facilities, and in some instances, to build a new plant once the development gets into full swing.

Subcontracting and contract manufacturing are other phases of diversification by the industry. Subcontracting, in which builders manufacture machine components for other builders, is rapidly disappearing in the present state of the tool market

Contract manufacturing is in a slightly better position from this standpoint, as the builder often makes and assembles the entire machine for mass distribution firms. Some builders have established contract manufacturing divisions to seek and handle such business.

Warner & Swasey Strike Ends; Business Reported Spotty From Detroit Region

o o o

In Cleveland, the big news was the ending of the Warner & Swasey strike after 6 months, following closely on a rapidly growing back-to-work movement by the men. A vote of union members of Lodge 1253 of the International Assn. of Machinists on June 28 overwhelmingly approved the joint management-union proposal that they return to work, leaving all issues to direct negotiations.

The men will return under the new rate schedule proposed by the management in its final offer which was rejected by the union. This schedule provided for wage increases up to 17¢ per hr for workers below the top scale, but no increase for top scale workers at $1.86 per hr.

The nub of the whole controversy was the unwillingness of the management to continue the inequitable practice which grew up in the lush war years of length of service wage rate increases. The company's wage schedule would continue the accumulated rates for those already receiving them, but discontinues the granting of service increments in the future. Under the new schedule, no rates have been reduced.

In Detroit, a survey of machine tool activity indicates that business here is very spotty. During the past week several new orders have been reported here for the new Fisher Body stamping plant in Pittsburgh. Tool ordering on this plant now appears to be well along toward completion.

Meanwhile, the industry is still anticipating placements from the Detroit Gear Div. of Borg-Warner for the new Studebaker automatic transmission unit. Up to the present time, there have been few releases on this program. Recent reports indicate that it may well be the end of the year before there are any significant developments on the new engine program for Dodge. It is known that the problem is being carefully studied by Chrysler management but there have been no releases so far.

Negotiations between the Detroit tool and die shops and the UAW-CIO began here this week. The union is asking for a substantial pay boost in the form of pensions, insurance and a wage increase. During the past year, employment in Detroit's numerous tool and die shops has fallen 25 pct and total number of hours worked has dropped more than a third.

HEAVY DUTY HOLE SAWS
for... Shop and Production Use.

A heavy duty type hole saw, which may radically change present shop practice for cutting large holes in steel or other machinable materials up to 1" thick, has been developed by the Armstrong-Blum Manufacturing Company of Chicago, who also build MARVEL Metal Sawing Machines and MARVEL High-Speed-Edge Hack Saw Blades.

These hole saws are designed for general use, not only in all types of portable power tools, but in drill presses, lathes and other standard machine tools. They reduce the cost of cutting large holes by saving setting up time, reducing machining time and lowering tooling and power costs. These economies result from the basic operating principles of a hole saw —the removal of a large core by making a narrow peripheral cut. For example, a 4½" hole with an area of approximately 16 square inches, can be sawed out with a hole saw by cutting away only 1⅓ square inches of metal.

The comparative area of metal which must be cut away to make a 4½" diameter hole

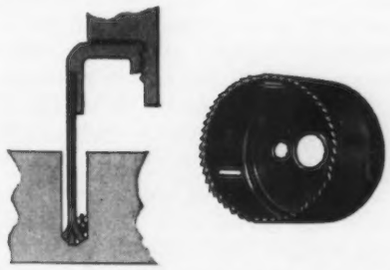
Added to the peripheral cutting principle, the "gang tool" cutting efficiency of a hole saw (a 4½" hole saw has 85 cutting teeth) *enables small capacity machine tools to cut large size holes.* A ½" portable drill can cut a 4½" hole thru ¼" steel plate in one minute. Compare this method with the ordinary practice of first, drilling a starting hole, second, setting-up a lathe or boring mill, and third, machining the hole, "a-chip-at-a-time."

BASIC DIFFERENCES IN HOLE SAWS

Hole saws are basically of two types: ordinary hole saws and MARVEL High-Speed-Edge Hole Saws. Ordinary hole saws have long been used by sheet metal workers and appliance installers for cutting holes thru sheetmetal, wallboard and other light gauge, soft material.

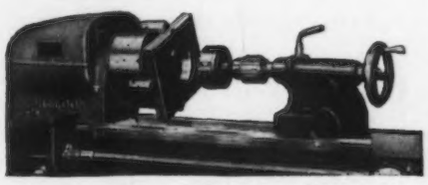
MARVEL High-Speed-Edge Hole Saws, on the other hand, were developed and designed specifically to broaden the usefulness of these tools. These uses include cutting holes in every type of machinable material to a depth of 1", as well as the usual applications. They are manufactured in sizes ranging from ⅝" to 4½" in diameter in steps of ⅛".

In order to be useful for such a wide variety of applications, a hole saw *must* have many exclusive and unique features. Due to the peripheral speed developing intense heat, a high speed steel cutting edge is essential. Furthermore, because hole saws are subjected to severe use and rough handling, the tool must be practically indestructible. MARVEL Hole Saws are made from the same materials used in the manufacture of the famous MARVEL Unbreakable High-Speed-Edge Hack Saw Blades. High speed teeth are welded to a tough, chrome vanadium body. In other words, the teeth can withstand extreme heat, will cut anything which can be cut with a high speed steel tool, yet they are unbreakable, due to the tough body which backs up the high speed steel teeth. To permit sawing deeper than the gullet of the teeth of the saw, chip clearance must be provided.

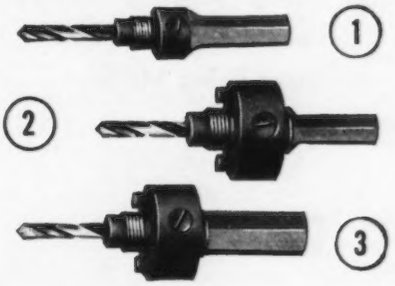


This is accomplished in MARVEL Hole Saws by a special method which produces an exclusive type of set. In every three teeth, one is set extremely to the inside, the next one straight and one slightly to the outside. The reason for the latter is to prevent binding of the saw in the cut, yet assuring fairly constant diameter during the life of the tool.

A tool which will withstand all demands imposed upon it requires an equally good arbor for the drive. MARVEL Hole Saw Arbors are all made from a solid bar of special alloy steel. One end is milled to a hexagon shank which will fit any ½", or larger, two or three jaw chuck. A special ¼" high speed steel pilot drill is furnished with each arbor. This pilot drill is held in the arbor by a set screw which contacts the drill at a 5° angle. To assure a positive lock, immune to the tendency to twist loose, the drill has a flat ground into the shank, also at a 5° angle. This method of holding the drill does not require undue stress on the jaw of the chuck to keep the pilot drill from turning in the arbor.



Only two arbors are required for the entire range of sizes, Numbers 2 and 3 being identical except for shank dimensions. These larger arbors, which are used on hole saws from 1¼" to 4½", incorporate a rugged, foolproof drive. The hole saw fits onto a ⅝" thread, but the thread does not carry the load of the drive. In the body of the arbor are two drive pins. These drive pins fit into two holes in the top



of the hole saws. In order to register the drive pins with the saw holes, it is necessary to back up the saw after it has contacted the shoulder of the arbor. When the drive pins are in place, the saw is provided with a positive, dual but flexible drive. This drive relieves the saw and pilot drill of undue strain by allowing a certain amount of "universal joint" movement. This is especially advantageous when the saw is used in portable power tools. The drive pins are not loose parts but are permanently fastened to the arbor and cannot be lost.

The No. 1 Arbors which accommodate hole saws from ⅝" to 1⅛", do not have drive pins, as on the smaller sizes this arrangement is unnecessary. The body of the smaller saws is welded to a hexagon back and removal of the hole saw is easily accomplished by clamping the hexagon shank in a vise and using a wrench on the hexagon part of the saw.

Occasionally it is difficult to use a hole saw because the body of the power tool prevents getting into close quarters or near to the work. To overcome these conditions, the No. 7 Extension is available. This handy extension is 12" long and fits over both the No. 1 and No. 2 Arbor, permitting the hole saw to be used that distance away from the power source.

Complete instructions for proper use of MARVEL Hole Saws — correct speed, lubrication and application — are packed in each standard package of ten saws. Bulletin ST-49 contains full description, illustrations and list prices and is available for the asking. Write for your copy today to Armstrong-Blum Mfg. Co., 5700 Bloomingdale Avenue, Chicago 39, Illinois.

MARVEL Metal Cutting SAWS
Better Machines - Better Blades

NONFERROUS METALS

. . . News and Market Activities

Tin Consumers Compare Fixed Prices With Cuts In Other Metals

Most Metal Markets Firmest In Recent Months; Some Sales Being Made

o o o

New York

• • • **For some time** tin consumers have been eyeing the fixed price of tin and contrasting this situation with the sharp declines in the prices of other nonferrous metals. The domestic price of tin has been set by the Reconstruction Finance Corp. in marketing tin in this country through its agency, the Tin Sales Corp. This agency markets almost all the tin used by domestic consumers under government import and allocations controls which were extended until June 30, 1950, when the President signed HR 5044 last week. Some low grade tin is now afloat which has been marketed in this country by private importers under a recent relaxation of control by the Dept. of Commerce.

The price of tin set by RFC is tied directly to the buying and selling prices of tin set by the British Ministry of Supply. The British Ministry contracts with producers in Malaya, Nigeria and Bolivia expired on June 30. Domestic price action depends pretty largely on what action the British Ministry is able to take with respect to renewal of its contracts. An official of RFC told THE IRON AGE late last week that no information had reached government circles yet on the price at which British contracts would be renewed.

The reason that the RFC price is tied to the British Ministry's price is that RFC buys straights tin. Bolivian concentrates are also bought under a contract which pegs the concentrates buying price to the RFC price of tin or the price of straights tin delivered New York, whichever is higher. The contract with Bolivian concentrates producers comes to an end at the end of the year.

The whole price situation is confused by the fact that the British Ministry's agreement with Nigerian producers contains a clause requiring 3 months' notice prior to termination. It appears to officials here that this clause would serve to prevent the British from reducing buying prices for Malayan and Bolivian tin at least for 3 months so as not to treat these producers inequitably with respect to those of Nigeria.

As the result of the general uncertainty about the price, RFC has not yet established its price for July deliveries. There is some remote possibility of RFC independent price action on tin should England continue to hold to its present price levels. This possibility is now being studied closely. There are many departments of government involved, including ECA, the Department of Commerce and RFC and the Munitions Board. Tin is being shipped into this country for stockpiling as a means of repaying part of ECA loans. Any action of this nature would, of course, represent a further step by the government in subsidizing the sale of tin to consumers. The government is already subsidizing the operation of the government smelter at Texas City, Tex.

Although the extension of controls over tin imports and allocations is for another year, it is quite likely that the Department of Commerce may take action to release controls at an earlier date. An official of the Department of Commerce told THE IRON AGE that the only reason for continuing controls was because of the unstable political conditions in Malaya, The East Indies and Bolivia. It would have been very difficult for the government to obtain a new control measure in an emergency should the present form of control be permitted to lapse.

There were no price developments in nonferrous metals last week. The markets were all firmer than at any time in recent months with consumers coming back into the markets for small tonnages. The order situations in copper and lead have not yet grown sufficiently strong to indicate any immediate prospect of higher prices.

Lead smelters recognized the tight lead scrap situation by lowering the smelting charge again this week to $40 a ton. The shortage of copper and brass scrap is growing and some refineries raised their buying prices by ½¢ per lb.

Monthly Average Prices

• • • **The average prices of the major nonferrous metals in May based on quotations appearing in THE IRON AGE, were as follows:**

	Cents Per Pound
Electrolytic copper, Conn. Valley	16.658
Lake copper, Conn. Valley	18.625
Grade A tin, New York	$1.03
Zinc, East St. Louis	9.567
Zinc, New York	10.267
Lead, St. Louis	11.85
Lead, New York	12.00

Nonferrous Metals Prices

	June 29	June 30	July 1	July 2	July 5
Copper, electro, Conn.	16.00	16.00	16.00	16.00	16.00
Copper, Lake, Conn.	18.625	18.625	18.625	18.625	18.625
Tin, Grade A, New York	$1.03	$1.03	$1.03	$1.03	$1.03
Zinc, East St. Louis	9.00	9.00	9.00	9.00	9.00
Lead, St. Louis	11.85	11.85	11.85	11.85	11.85

Note: Quotations are going prices.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, 10,000 lb, freight allowed	17.00
Aluminum pig	16.00
Antimony, American, Laredo, Tex.	38.50
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be	$24.50
Beryllium aluminum 5% Be, dollars per lb contained Be	$52.00
Bismuth, ton lots	$2.00
Cadmium, del'd	$2.00
Cobalt, 97-99% (per lb)	$1.80 to $1.87
Copper, electro, Conn. Valley	16.00
Copper, lake, Conn. Valley	18.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$100 to $110
Lead, St. Louis	11.85
Lead, New York	12.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex.	20.50
Magnesium, sticks, carlots	34.50
Mercury, dollars per 76-lb flask f.o.b. New York	$82 to $84
Nickel, electro, f.o.b. New York	42.93
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$69 to $72
Silver, New York, cents per oz.	71.50
Tin, Grade A, New York	$1.03
Zinc, East St. Louis	9.00
Zinc, New York	9.70
Zirconium copper, 10-12 pct Zr, per lb contained Zr	$12.00

Remelted Metals

Brass Ingot

(Published prices, cents per lb delivered, carloads)

85-5-5-5 ingot		
No. 115	13.75*	15.50
No. 120	13.25*	15.00
No. 123	12.75*	14.50
80-10-10 ingot		
No. 305	....	20.00
No. 315	....	17.00
88-10-2 ingot		
No. 210	....	26.50
No. 215	....	23.50
No. 245	16.50*	18.25
Yellow ingot		
No. 405	11.50*	13.25
Manganese bronze		
No. 421	....	18.00

* F.o.b. Philadelphia.

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys	
0.30 copper, max.	19.00-19.50
0.60 copper, max.	18.50-19.00
Piston alloys (No. 122 type)	16.00-16.50
No. 12 alum. (No. 2 grade)	14.75-15.25
108 alloy	15.50-16.00
195 alloy	17.00-17.50
13 alloy	18.50-19.00
AXS-679	15.75-16.25
5% Ti, Aluminum, f.o.b.	
Low copper	31.00
2% copper	28.00

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95-95½%	15.75-16.25
Grade 2—92-95%	14.75-15.25
Grade 3—90-92%	13.75-14.25
Grade 4—85-90%	12.75-13.25

Electroplating Supplies

Anodes

(Cents per lb, freight allowed, in 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	34⅝
Electrodeposited	28⅞
Rolled, oval, straight, delivered	31.84
Ball anodes	32⅞
Brass, 80-20	
Cast, oval, 15 in. or longer	30⅜
Zinc, oval, 99.886, f.o.b. Detroit	22½
Ball anodes	20½
Nickel 99 pct plus	
Cast	59.00
Rolled, depolarized	60.00
Cadmium	$2.15
Silver 999 fine, rolled, 100 oz. lots, per troy oz, f.o.b. Bridgeport, Conn.	79

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	48.00
Copper sulfate, 99.5 crystals, bbl.	9.10
Nickel salts, single or double, 4-100 lb bags, frt. allowed	18.00
Nickel chloride, 300 lb bbl	24.50
Silver cyanide, 100 oz. lots, per oz.	59
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc sulfate, crystals, 22.5 pct, bags	6.75
Zinc sulfate, 25 pct, flakes, bbl.	7.75

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb, f.o.b. shipping point, freight allowed)

Flat Sheet: 0.188 in., 2S, 3S, 26.9¢; 4S, 61S-O, 28.8¢; 52S, 30.9¢; 24S-O, 24S-OAL, 29.8¢; 75S-O, 75S-OAL, 36.3¢; 0.081 in., 2S, 3S, 27.9¢; 4S, 61S-O, 30.2¢; 52S, 32.3¢; 24S-O, 24S-OAL, 30.9¢; 75S-O, 75S-OAL, 38¢; 0.032 in., 2S, 3S, 29.5¢; 4S, 61S-O, 33.5¢; 52S, 36.2¢; 24S-O, 24S-OAL, 37.9¢; 75S-O, 75S-OAL, 47.6¢.

Plate: ¼ in. and heavier: 2S, 3S, F, 23.8¢; 4S-F, 26¢; 52S-F, 27.1¢; 61S-O, 26.6¢; 24S-F, 24S-FAL, 27.1¢; 75S-F, 75S-FAL, 33.9¢.

Extruded Solid Shapes: Shape factors 1 to 4, 35.1¢ to 66¢; 11 to 13, 36.1¢ to 78¢; 23 to 25, 38.2¢ to $1.07; 35 to 37, 45.7¢ to $1.65; 47 to 49, 67.5¢ to $2.41.

Rod, Rolled: 1.064 to 4.5 in., 2S-F, 3S-F, 34¢ to 30.5¢; Cold-finished, 0.375 to 3.5 in., 2S, 3S, 36.5¢ to 32¢.

Screw Machine Stock: Drawn, ⅛ to 11/32 in., 11S-T3, R317-T4, 49¢ to 38¢; cold-finished, ⅜ to 1½ in., 11S-T3, 37.5¢ to 35.5¢; ⅜ to 2 in., R317-T4, 37.5¢ to 34.5¢; rolled, 1 9/16 to 3 in., 11S-T3, 35.5¢ to 32.5¢; 2⅛ to 3⅜ in., R317-T4, 33.5¢ to 32.5¢. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in.: 2S, 36¢ to 26.5¢; 52S, 44¢ to 32¢; 56S, 47¢ to 38.5¢; 17S-T4, 50¢ to 34.5¢; 61S-T4, 44.5¢ to 34¢; 75S-T6, 76¢ to 55¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed Base quantity 30,000 lb)

Sheet and Plate: Ma, FSa, ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 12, 63¢-65¢; 14, 69¢-74¢; 16, 76¢-81¢; 18, 84¢-89¢; 20, 96¢-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.

Extruded Round Rod: M, diam in., ¼ to 0.311, 58¢; ½ to ¾, 46¢; 1⅛ to 1.749, 43¢; 2½ to 5, 41¢. Other alloys higher.

Extruded Square, Hex. Bar: M, size across flats, in., ¼ to 0.311, 61¢; ½ to 0.749, 48¢; 1¼ to 1.749, 44¢; 2½ to 4, 42¢. Other alloys higher.

Extruded Solid Shapes, Rectangles: M, in weight per ft, for perimeters of less than size indicated, 0.10 to 0.11 lb per ft, per. up to 3.5 in., 55¢; 0.22 to 0.25 lb per ft, per. up to 5.9 in., 51¢; 0.50 to 0.59 lb per ft, per. up to 8.6 in., 47¢; 1.8 to 2.59 lb per ft, per. up to 19.5 in., 44¢; 4 to 6 lb per ft, per. up to 28 in., 43¢. Other alloys higher.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.14; 5/16 to ⅜, $1.02; ½ to ⅝, 76¢; 1 to 2 in., 65¢; 0.065 to 0.082, ⅜ to 7/16, 85¢; ⅝ to ¾, 62¢; 1 to 2 in., 57¢; 0.165 to 0.219, ⅝ to ¾, 54.5¢; 1 to 2 in., 53¢; 3 to 4 in., 49¢. Other alloys higher.

Nickel and Monel

(Base prices, cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	60	47
Strip, cold-rolled	66	50
Rods and shapes		
Hot-rolled	56	45
Cold-drawn	56	45
Angles, hot-rolled	56	45
Plates	58	46
Seamless tubes	89	80
Shot and blocks	..	40

Copper, Brass, Bronze

(Cents per pound, freight prepaid on 200 lb)

	Sheets	Rods	Extruded Shapes
Copper	30.68	....	30.28
Copper, hot-rolled	....	26.53	....
Copper, drawn	....	27.78	....
Low brass	27.97	27.66	30.38*
Yellow brass	26.77	26.46	29.78*
Red brass	28.36	28.05	31.27*
Naval brass	31.77	25.83	27.08
Leaded brass	....	21.34	25.47
Commercial bronze	29.28	28.97	31.94*
Manganese bronze	35.27	29.18	30.68
Phosphor bronze, 5 pct	48.92	49.17	....
Muntz metal	29.78	25.34	26.59
Everdur, Herculoy, Olympic, etc.	34.63	33.58	....
Nickel silver, 10 pct	37.80	40.14	40.34
Architectural bronze	....	....	25.47

*Seamless tubing

Scrap Metals

Brass Mill Scrap

(Cents per pound; add ½¢ per lb for shipments of 20,000 to 40,000 lb; add 1¢ for more than 40,000 lb)

	Heavy	Turnings
Copper	13¼	12½
Yellow brass	10¾	10
Red brass	11⅞	11⅛
Commercial bronze	11⅞	11⅛
Manganese bronze	10¾	10
Leaded brass rod ends	10½	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	12.50
No. 2 copper wire	11.50
Light copper	10.50
Refinery brass	10.00*
Radiators	7.00 to 7.25

*Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer)

No. 1 copper wire	12.50
No. 2 copper wire	11.50
Light copper	10.50
No. 1 composition	9.50
No. 1 comp. turnings	9.00
Rolled brass	7.00 to 7.25
Brass pipe	8.25
Radiators	7.50
Heavy yellow brass	7.00
Aluminum	
Mixed old cast	7.50
Mixed old clips	7.50
Mixed turnings, dry	6.00
Pots and pans	7.50
Low copper	11.00

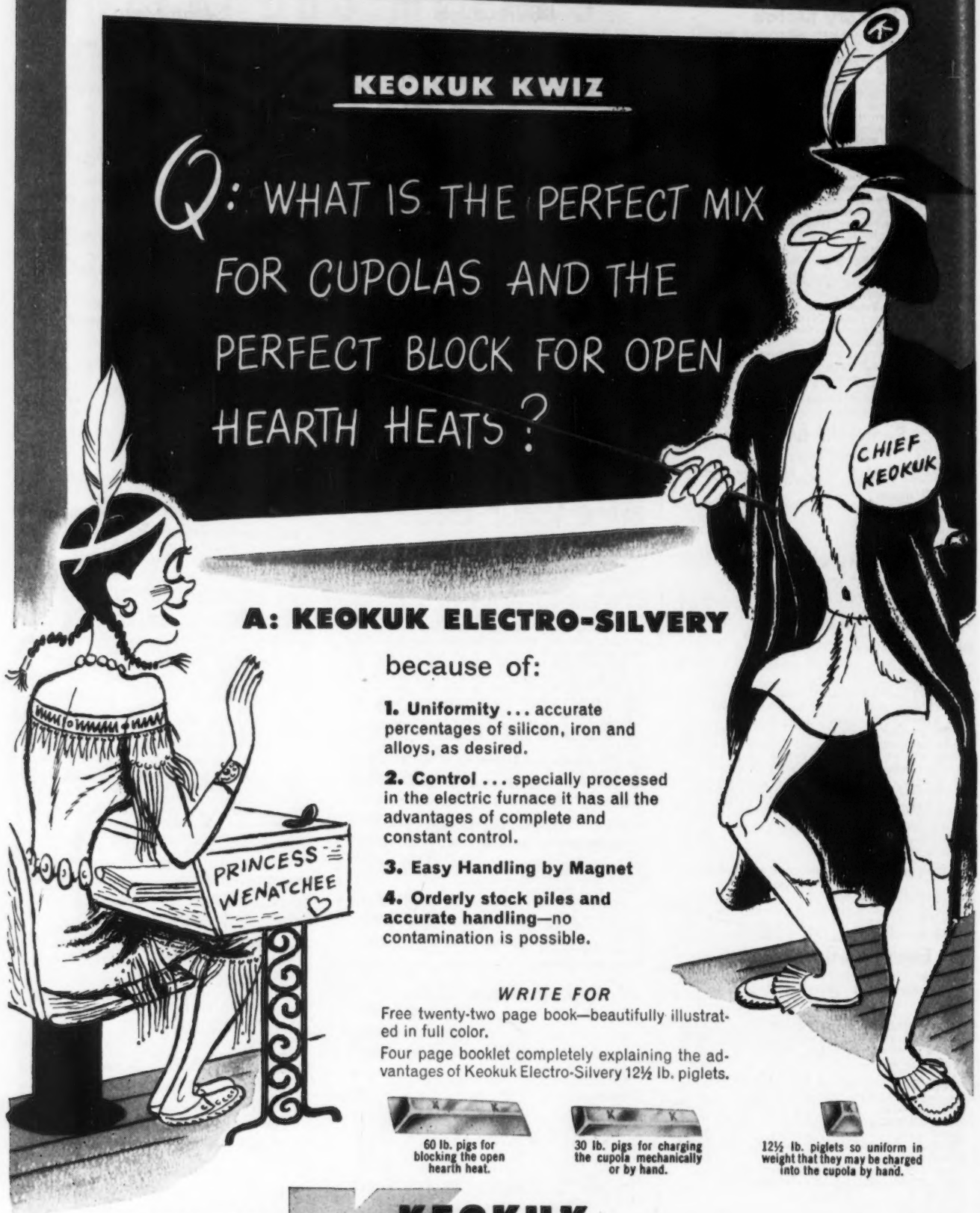
Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound)

Copper and Brass	
No. 1 heavy copper and wire	10½—11
No. 2 heavy copper and wire	9½—10
Light copper	8½— 9
Auto radiators (unsweated)	5¾— 6
No. 1 composition	7¾— 8
No. 1 composition turnings	7¼— 7¾
Clean red car boxes	6½— 6¾
Cocks and faucets	6½— 6¾
Mixed heavy yellow brass	5¼— 5½
Old rolled brass	5¾— 6
Brass pipe	6¾— 7
New soft brass clippings	8½— 9
Brass rod ends	6½— 7
No. 1 brass rod turnings	5½— 6
Aluminum	
Alum. pistons and struts	3¼— 3½
Aluminum crankcases	5 — 5½
2S aluminum clippings	9 — 9½
Old sheet and utensils	5 — 5½
Borings and turnings	3
Misc. cast aluminum	5 — 5½
Dural clips (24S)	5 — 5½
Zinc	
New zinc clippings	4½— 5
Old zinc	3 — 3½
Zinc routings	2 — 2½
Old die cast scrap	2
Nickel and Monel	
Pure nickel clippings	16 —17
Clean nickel turnings	14 —15
Nickel anodes	16 —17
Nickel rod ends	16 —17
New Monel clippings	10½—11½
Clean Monel turnings	6 — 7
Old sheet Monel	8 — 9
Old Monel castings	7 — 8
Inconel clippings	10 —11
Nickel silver clippings, mixed	6 — 7
Nickel silver turnings, mixed	5½— 6
Lead	
Soft scrap, lead	8 — 8½
Battery plates (dry)	4¾— 5
Magnesium Alloys	
Segregated solids	9 —10
Castings	5½— 6½
Miscellaneous	
Block tin	70 —72
No. 1 pewter	47 —49
No. 1 auto babbitt	40 —42
Mixed common babbitt	9 — 9½
Solder joints	10½—11
Siphon tops	45 —47
Small foundry type	11½—12
Monotype	9½—10
Lino. and stereotype	9 — 9½
Electrotype	7 — 7½
New type shell cuttings	8 — 8¼
Hand picked type shells	4
Lino. and stereo. dross	5 — 5½
Electro. dross	3½— 4

KEOKUK KWIZ

Q: WHAT IS THE PERFECT MIX FOR CUPOLAS AND THE PERFECT BLOCK FOR OPEN HEARTH HEATS?



A: KEOKUK ELECTRO-SILVERY

because of:

1. Uniformity ... accurate percentages of silicon, iron and alloys, as desired.

2. Control ... specially processed in the electric furnace it has all the advantages of complete and constant control.

3. Easy Handling by Magnet

4. Orderly stock piles and accurate handling—no contamination is possible.

WRITE FOR

Free twenty-two page book—beautifully illustrated in full color.

Four page booklet completely explaining the advantages of Keokuk Electro-Silvery 12½ lb. piglets.

60 lb. pigs for blocking the open hearth heat.

30 lb. pigs for charging the cupola mechanically or by hand.

12½ lb. piglets so uniform in weight that they may be charged into the cupola by hand.

60-lb. pigs for steel plants

30-lb. pigs and 12½-lb. piglets for foundries.

KEOKUK
electro-silvery

BY KEOKUK ELECTRO-METALS COMPANY
KEOKUK, IOWA

WENATCHEE DIVISION, WENATCHEE, WASHINGTON

SALES AGENTS: Miller and Company — 332 S. Michigan Avenue, Chicago 4, Illinois — 3504 Carew Tower, Cincinnati 2, Ohio — 407 N. Eighth Street, St. Louis 1, Missouri

SCRAP

Prices Hold But Trading Is Dull

New York

• • • **The downward trend** of prices was halted this week—the first time in almost 2 months. Mills have been doing some buying, but are careful of shipping dates in the advent of a steel strike. Most foundries will be out of the market during July. Some scrap has been sold in distant market areas, but this practice is prohibitive in most cases because of high freight rates.

This week THE IRON AGE scrap composite remained unchanged at $19.33 per gross ton which is also the low for the year. Prices of No. 1 heavy melting steel this week are: Pittsburgh, $20.50 to $21.00; Chicago, $19.50 to $20.00; and Philadelphia, $17.00 to $18.00.

With the vacation period at hand and the uncertainty of the present situation, market observers do not expect any significant change during July. Brokers have been unable to renew many of the old contracts which ran out last month. Trying to secure new orders from the mills and foundries has not proved successful. However, if large orders are received it is doubtful whether dealers could fill these orders at today's prices. Dealers are doing some selling to keep the men busy, but not enough to show a profit.

According to reports from the trade, 4000 tons of turnings are to be exported to Europe around the middle of this month. Canadian consumers have also been dependent on U. S. scrap imports for a large part of their needs. Some of this scrap originated in the eastern part of the U. S. However, in the northwest, Canadian scrap is imported into the U. S.

Dealers have been doing some stockpiling during the past month. Some of this material consists of industrial scrap which must be moved, and others is high quality material for which there is usually a home. There is also a limit to the amount of material which a dealer can pile. This will depend upon his finances and the capacity of the yard.

PITTSBURGH—The market is dead this week. Declining steel operations and the threat of a steel strike are responsible. No shipments can be planned to reach mills after July 15 in case of a strike. Consumers who have been taking customer scrap have put out the word that they don't want it. Some will still take it but fabricators have been told they need feel no responsibility to ship to the mills; the latter would be mighty glad to see it sold elsewhere. The only price changes of the week are in railroad specialties which are off to a quotation of $24.00 to $24.50. Cast business is duller than ever.

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CHICAGO—What little activity remains in the market is good only to July 15. If there is no strike by then the mills will revise their present plans and the market may see renewed vigor. If the strike starts the little life left in the market is expected to disappear, with the exception of some shipments of cast scrap to foundries. Most implement foundries are still doing fairly well. Some of them came back into the market in recent weeks. How long the implement makers could run in face of a steel strike is not known, but their foundries have stockpiled coke, iron and some scrap, indicating they will run as long as possible or until inventories are depleted.

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PHILADELPHIA—Little interest was shown in any buying or selling during the past week. Mills have been curtailing their production due to vacation periods. Some dealers have refused to sell material at the brokers' terms. Activity in this area will be nil during the coming week. Scrap yards will be closed this week for the vacation period. Shoveling turnings dropped 50¢. Low phosphorus electric furnace and low phosphorus acid openhearth grades were off $2.00 on the low side for the week. Other quoted prices are based on appraisal of all market conditions.

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CLEVELAND — There was no new business in this district last week, but in the Valley a small tonnage of No. 1 heavy melting was bought at $20.00. It is expected that there may be additional tonnage placed at this figure, thereby bringing down quoted prices in both markets by 50¢. A small sale of shovelings was made here at $15.00. There has been a small increase in foundry business at previously quoted prices. Fisher Body scrap, some 25,000 to 30,000 tons, is reported to have sold at $3.00 to $4.00 lower than a month ago. The scrap trade expects to find no real improvement in orders during July at least, due to closings at mills and foundries.

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CINCINNATI—No mills in this district are taking scrap, but there has been some small amount of buying of turnings and shovelings for specialties. Foundry orders have picked up a little. All foundries in this district are closed down now. Reductions in quoted prices have been made in heavy melting grades, but all prices are considered nominal.

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DETROIT—The holiday has acted as a drug on an already market here. New business is practically at a standstill. Movement of dealers' scrap is much poorer than that of industrial scrap being generated in the still busy auto plants. Mill caution in the event of a steel strike has also slowed the market. Mills are refusing to accept delivery on material after July 15. These uncertainties have caused brokers to be afraid to make new commitments. This week there is plenty of material available but few buyers.

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NEW YORK—There was no change in the market this week, with little demand and a few new orders. Orders are small and usually require delivery within a short period of time. Some commitments have been made for July, but at lower prices. Foundries are out of the market for July, however, inquiries have increased and there is a possibility that August will show some improvement in this business. Mills have been doing some buying, but for immediate delivery only. Mixed borings and turnings, machinery cast, mixed yard cast, and clean cast chemical borings were off for the week.

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ST. LOUIS—Marking time on account of the holiday. This has been a dull week in the scrap iron market with prices unchanged. Receipts are off through the combination of low prices and hot weather. Railroad lists: International Great Northern, 1200 tons and St. Louis Southwestern, 1400 tons.

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BOSTON—Scrap items continued to slip all along the line, and No. 1 steel, with only the smallest amount of activity, is quoted at $10.00 to $11.00, a new low price for the current move. Other categories are very dull with hardly a market. Cast grades, likewise, are stagnant.

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BIRMINGHAM—Except for a very mild interest in No. 1 cupola cast which has yet to be reflected in any advance in price, demand for scrap here is all but nonexistent for another week. Truckers, paying 30¢ a gal for gasoline, are finding it difficult, if not impossible, to make a profit at present price levels. As a result, receipts from that source are extremely light at dealers' yards.

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BUFFALO—Widening of the discount on No. 2 bundles by 50¢ to $2.50 under No. 2 steel marked trading here in the past week. One of the leading consumers purchased comparatively light tonnages of No. 2 heavy melting at $17.50, No. 2 bundles at $15.00 and galvanized bundles at $13.50. The inside price on low phos plate was reduced 50¢ on small sales. Blast furnace operators were reported out of the market for turnings and borings and the light end of the list was dropped another 50¢. Cast scrap was dead.

IRON AND STEEL SCRAP PRICES

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.50 to $21.00
R.R. hvy. melting	21.50 to 22.00
No. 2 hvy. melting	18.50 to 19.00
No. 2 bundles	16.50 to 17.00
R.R. scrap rails	23.00 to 24.00
Rails 2 ft and under	26.50 to 27.50
No. 1 comp'd bundles	20.50 to 21.00
Hand bdld. new shts.	18.50 to 19.00
Hvy. steel forge turn.	17.50 to 18.00
Mach. shop turn.	13.50 to 14.00
Shoveling turn.	16.50 to 17.00
Mixed bor. and ms. turn.	13.50 to 14.00
Cast iron borings	16.50 to 17.00
No. 1 mach. cast.	26.00 to 27.00
Mixed yard cast.	21.50 to 22.50
Hvy. breakable cast.	18.50 to 19.00
Malleable	22.50 to 23.00
RR. knuck. and coup.	24.00 to 24.50
RR. coil springs	24.00 to 24.50
RR. leaf springs	24.00 to 24.50
Rolled steel wheels	24.00 to 24.50
Low phos.	21.50 to 22.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50 to $20.00
No. 2 hvy. melting	17.50 to 18.00
Factory bundles	19.50 to 20.00
No. 1 dealers' bundles	17.00 to 18.00
No. 2 dealers' bundles	15.00 to 16.00
Mach. shop turn.	11.00 to 12.00
Short shov. turn.	13.00 to 14.00
Cast iron borings	12.00 to 13.00
Mix. borings and turn.	9.00 to 10.00
Low phos. hvy. forge	23.00 to 24.00
Low phos. plates	21.00 to 22.00
No. 1 RR. hvy. melt.	21.00 to 21.50
Rerolling rails	27.00 to 28.00
Miscellaneous rails	23.50 to 24.00
Angles and splice bars	24.00 to 25.00
Locomotive tires, cut	26.00 to 27.00
Cut bolster & side frames	23.00 to 24.00
Standard stl. car axles	26.00 to 27.00
No. 3 steel wheels	24.00 to 24.50
Couplers and knuckles	23.00 to 24.00
Rails, 2 ft and under	27.00 to 28.00
Malleable	22.00 to 24.00
No. 1 mach. cast.	29.00 to 30.00
No. 1 agricul. cast.	27.00 to 29.00
Heavy breakable cast.	22.50 to 23.50
RR. grate bars	18.00 to 18.50
Cast iron brake shoes	17.50 to 18.50
Cast iron car wheels	28.00 to 29.00

CINCINNATI

Per gross ton, f.o.b. cars:

No. 1 hvy. melting	$16.50 to $17.00
No. 2 hvy. melting	15.00 to 15.50
No. 1 bundles	16.50 to 17.00
No. 2 bundles	13.00 to 14.00
Mach. shop turn.	7.00 to 8.00
Shoveling turn.	7.00 to 8.00
Cast iron borings	8.00 to 9.00
Mixed bor. and turn.	7.00 to 8.00
Low phos. 18 in. under	24.00 to 25.00
No. 1 cupola cast.	25.00 to 26.00
Hvy. breakable cast.	17.00 to 18.00
Rails 18 in. and under	29.00 to 30.00
Rails random length	19.00 to 20.00
Drop broken	29.00 to 30.00

BOSTON

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$10.00 to $11.00
No. 2 hvy. melting	8.00 to 8.50
No. 1 bundles	10.00 to 10.75
No. 2 bundles	8.00 to 9.00
Bushelings	7.50 to 8.00
Shoveling turn.	7.00 to 7.50
Machine shop turn.	3.00 to 3.50
Mixed bor. and turn.	2.50 to 3.00
Cl'n cast chem. bor.	9.00 to 10.00
No. 1 machinery cast.	26.00 to 29.00
No. 2 machinery cast.	18.00 to 21.50
Heavy breakable cast.	16.00 to 17.00
Stove plate	16.00 to 17.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	$12.50 to $13.00
No. 2 hvy. melting	10.50 to 11.00
No. 1 bundles	12.50 to 13.00
New busheling	12.50 to 13.00
Flashings	12.50 to 13.00
Mach. shop turn.	7.00 to 7.50
Shoveling turn.	8.00 to 8.50
Cast iron borings	8.00 to 8.50
Mixed bor. and turn	7.00 to 7.50
Low phos. plate	12.50 to 13.00
Heavy breakable cast.	13.50 to 16.50
Stove plate	16.00 to 17.00
Automotive cast.	21.00 to 23.00
No. 1 cupola cast.	19.50 to 21.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00 to $18.00
No. 2 hvy. melting	16.00 to 17.00
No. 1 bundles	17.00 to 18.00
No. 2 bundles	15.00 to 16.00
Mach. shop turn.	10.50 to 11.50
Shoveling turn.	12.50 to 13.50
Mixed bor. and turn.	10.00 to 10.50
Clean cast chemical bor.	16.00 to 17.00
No. 1 machinery cast.	27.00 to 28.00
No. 1 mixed yard cast.	24.00 to 25.00
Hvy. breakable cast	23.00 to 24.00
Hvy. axle forge turn.	17.00 to 18.00
Low phos. electric furnace	20.00 to 21.00
Low phos. acid openhearth	19.00 to 20.00
Low phos. bundles	17.00 to 18.00
RR. steel wheels	22.00 to 22.50
RR.coil springs	22.00 to 22.50
RR. malleable	23.00 to 24.00
Cast iron carwheels	27.00 to 28.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.00 to $19.00
No. 2 hvy. melting	17.00 to 18.00
No. 2 bundled sheets	15.00 to 16.00
Mach. shop turn.	10.00 to 11.00
Shoveling turnings	10.00 to 11.00
Locomotive tires, uncut	18.00 to 19.00
Mis. std. sec. rails	21.00 to 22.00
Steel angle bars	23.00 to 24.00
Rails 3 ft and under	25.00 to 26.00
RR. steel springs	21.00 to 22.00
Steel car axles	25.00 to 26.00
Brake shoes	19.00 to 20.00
Malleable	19.00 to 20.00
Cast iron car wheels	24.00 to 25.00
No. 1 machinery cast.	23.00 to 25.00
Hvy. breakable cast.	19.00 to 20.00
Stove plate	20.00 to 21.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.00
No. 2 hvy. melting	18.00
No. 2 bundles	16.00
No. 1 busheling	18.00
Long turnings	13.00
Shoveling turnings	15.00
Cast iron borings	15.00
Bar crops and plate	22.50
Structural and plate	22.50
No. 1 cupola cast.	26.00
Stove plate	20.00
No. 1 RR. hvy. melt.	$20.00 to 20.50
Steel axles	20.00
Scrap rails	20.00
Rerolling rails	22.50 to 23.00
Angles & splice bars	22.00 to 23.00
Rails 2 ft & under	23.00 to 24.00
Cast iron carwheels	17.00 to 18.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50 to $20.00
No. 2 hvy. melting	17.00 to 17.50
No. 1 bundles	19.50 to 20.00
No. 2 bundles	15.50 to 16.00
Mach. shop turn.	10.00 to 10.50
Short shov. turn.	16.00 to 16.50
Cast iron borings	16.00 to 16.50
Low phos.	20.50 to 21.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$11.00 to $11.50
No. 2 hvy. melting	10.00 to 10.50
No. 2 bundles	9.00 to 10.00
Mach. shop turn.	5.25 to 5.75
Mixed bor. turn.	4.75 to 5.25
Shoveling turnings	7.00 to 8.00
Machinery cast.	18.50 to 19.50
Mixed yard cast.	17.50 to 18.50
Heavy breakable cast.	16.00 to 16.50
Charging box cast.	16.00 to 16.50
Unstrp. motor blks.	14.50 to 15.00
Cl'n cast chem. bor.	11.00 to 12.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.00 to $19.50
No. 2 hvy. melting	17.00 to 17.50
No. 1 bundles	17.00 to 17.50
No. 2 bundles	14.50 to 15.00
No. 1 busheling	17.00 to 17.50
Mach. shop turn.	10.00 to 10.50
Shoveling turn.	13.50 to 14.50
Cast iron borings	13.50 to 14.00
Mixed bor. and turn.	13.50 to 14.00
Cupola cast.	22.00 to 23.00
Mixed yard cast.	20.00 to 21.00
Stove plate	20.00 to 21.00
Small indus, malleable	18.00 to 19.00
Low phos. plate	19.50 to 20.50
Scrap rails	23.00 to 24.00
Rails 3 ft & under	30.00 to 31.00
RR. steel wheels	23.00 to 24.00
RR. coil & leaf spgs.	23.00 to 24.00
RR. knuckles & coup.	23.00 to 24.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$16.00 to $16.50
No. 2 hvy. melting	14.50 to 15.00
No. 1 bundles	16.00 to 16.50
No. 2 bundles	13.50 to 14.00
No. 1 busheling	16.00 to 16.50
Drop forge flashings	16.00 to 16.50
Mach. shop turn.	9.00 to 9.50
Shoveling turn.	14.00 to 15.00
Steel axle turn.	16.00 to 16.50
Cast iron borings	15.50 to 16.00
Mixed bor. & turn.	15.50 to 16.00
Low phos. 2 ft and under	18.00 to 18.50
No. 1 mach. cast.	26.50 to 27.00
Malleable	20.50 to 21.50
RR. cast.	26.50 to 27.50
Railroad grate bars	19.50 to 20.00
Stove plate	19.50 to 20.00
RR. hvy. melting	19.00 to 19.50
Rails 3 ft and under	26.00 to 27.00
Rails 18 in. and under	27.00 to 28.00

SAN FRANCISCO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00
No. 2 hvy. melting	18.00
No. 1 bales	16.00
No. 2 bales	16.00
No. 3 bales	13.00
Mach. shop turn.	12.00
Elec. fur. 1 ft under	28.00
No. 1 cupola cast.	$20.00 to 25.00
RR. hvy. melting	20.00
Rails	23.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00
No. 2 hvy. melting	18.00
No. 1 bales	16.00
No. 2 bales	16.00
No. 3 bales	13.00
Mach. shop turn.	12.00
Elec. fur. 1 ft under	30.00
No. 1 cupola cast.	$24.00 to 26.00
RR. hvy. melting	20.00

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	$20.00
No. 1 & No. 2 bales	16.00
No. 3 bales	13.00
Elec. fur. 1 ft and under	22.00
No. 1 cupola cast.	$20.00 to 27.00
RR. hvy. melting	20.00

HAMILTON, ONT.

Per gross ton delivered to consumer: Cast Grades f.o.b. shipping point:

Heavy melting	$23.00*
No. 1 bundles	23.00*
No. 2 bundles	22.50*
Mechanical bundles	21.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.50*
Bushelings, new fact, prop'd	21.00*
Bushelings, new fact, unprop'd	16.00*
Short steel turnings	17.00*
No. 1 cast.	$48.00 to 50.00
No. 2 cast.	44.00 to 45.00

*Ceiling Price.

For the Purchase or Sale of Iron and Steel Scrap . . .

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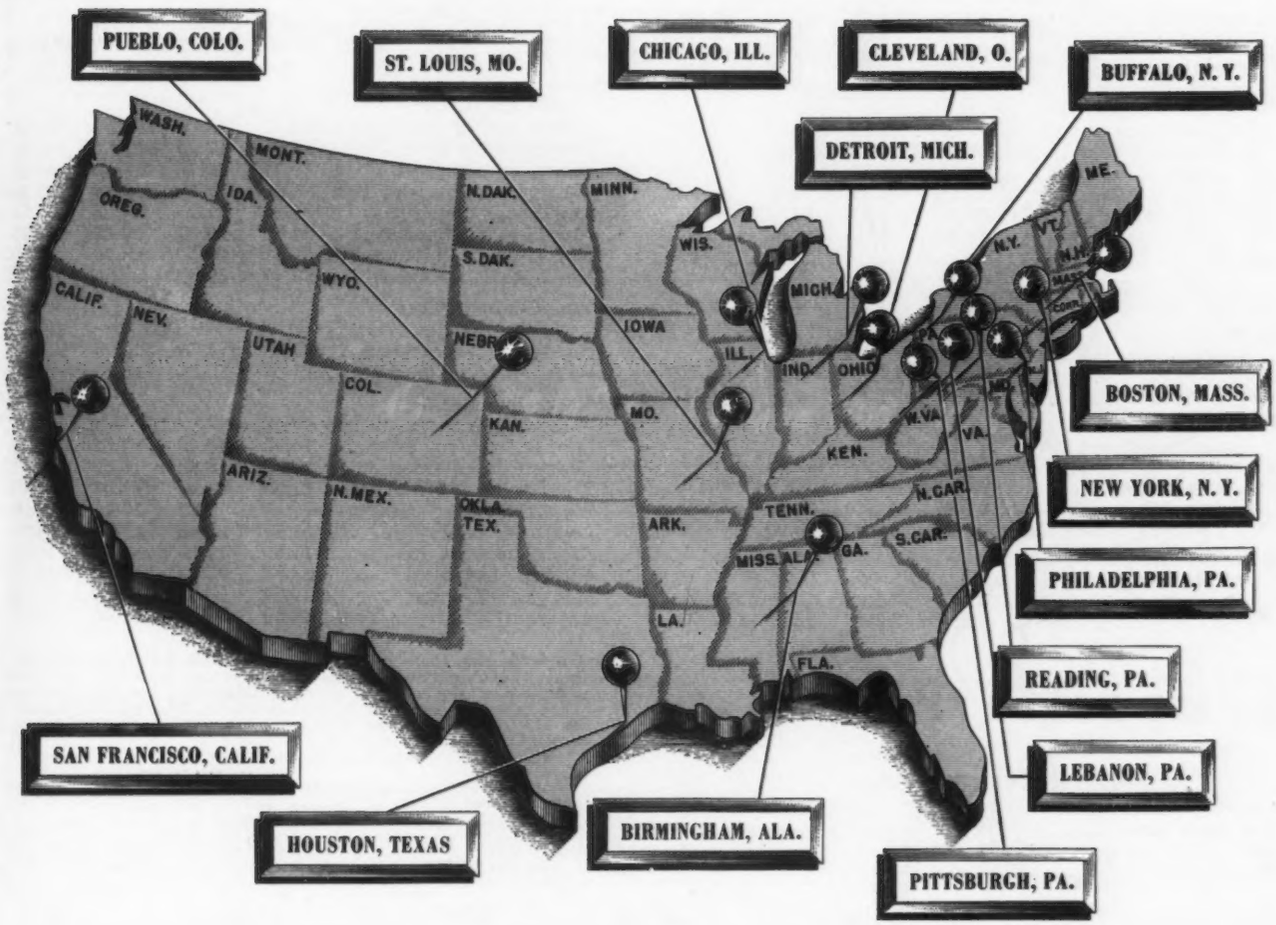

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Comparison of Prices . .

Price advances over previous week are printed in Heavy Type: declines appear in *Italics*.

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel: (cents per pound)	July 5, 1949	June 28, 1949	June 7, 1949	July 6, 1948
Hot-rolled sheets	3.25	3.25	3.25	2.775
Cold-rolled sheets	4.00	4.00	4.00	3.495
Galvanized sheets (10 ga)	4.40	4.40	4.40	3.913
Hot-rolled strip	3.25	3.25	3.25	2.775
Cold-rolled strip	4.038	4.038	4.038	3.535
Plates	3.40	3.40	3.40	2.93
Plates wrought iron	7.85	7.85	7.85	7.25
Stains C-R strip (No. 302)	33.25	33.25	33.25	30.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes	$7.75	$7.75	$7.75	$6.70
Tinplate, electro (0.50 lb)	6.70	6.70	6.70	5.90
Special coated mfg. ternes	6.65	6.65	6.65	5.80
Bars and Shapes: (cents per pound)				
Merchant bars	3.35	3.35	3.35	2.875
Cold-finished bars	3.995	3.995	3.995	3.483
Alloy bars	3.75	3.75	3.75	3.213
Structural shapes	3.25	3.25	3.25	2.767
Stainless bars (No. 302)	28.50	28.50	28.50	26.00
Wrought iron bars	9.50	9.50	9.50	8.65
Wire: (cents per pound)				
Bright wire	4.15	4.15	4.15	3.608
Rails: (dollars per 100 lb)				
Heavy rails	$3.20	$3.20	$3.20	$2.725
Light rails	3.55	3.55	3.55	3.05
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$52.00	$52.00	$52.00	$45.00
Slabs, rerolling	52.00	52.00	52.00	45.00
Forging billets	61.00	61.00	61.00	54.00
Alloy blooms, billets, slabs	63.00	63.00	63.00	66.00
Wire rod and Skelp: (cents per pound)				
Wire rods	3.40	3.40	3.40	3.133
Skelp	3.25	3.25	3.25	2.888

Pig Iron: (per gross ton)	July 5, 1949	June 28, 1949	June 7, 1949	July 6, 1948
No. 2, foundry, Phila.	$50.56	$50.56	$50.56	$44.74
No. 2, Valley furnace	46.50	46.50	46.50	39.50
No. 2, Southern Cin'ti*	45.47	45.47	45.47	45.47
No. 2, Birmingham	39.38	39.38	39.38	39.38
No. 2, foundry, Chicago†	46.50	46.50	46.50	39.00
Basic del'd Philadelphia*	49.74	49.74	49.74	44.24
Basic, Valley furnace	46.00	46.00	46.00	39.00
Malleable, Chicago†	46.50	46.50	46.50	39.50
Malleable, Valley	46.50	46.50	46.50	39.50
Charcoal, Chicago	73.78	73.78	73.78	65.55
Ferromanganese‡	173.40	173.40	173.40	145.00

†The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡Average of U. S. prices quoted on Ferroalloy page.
*Does not include interim increase on total freight charges, effective Jan. 11, 1949.

Scrap (per gross ton)	July 5, 1949	June 28, 1949	June 7, 1949	July 6, 1948
Heavy melt'g steel, P'gh.	$20.75	$20.75	$22.50	$40.25
Heavy melt'g steel, Phila.	17.50	17.50	21.00	42.50
Heavy melt'g steel, Ch'go	19.75	19.75	21.50	40.00
No. 1, hy. comp. sh't Det.	*12.75*	13.75	15.75	35.50
Low phos. Young'n	21.25	21.25	23.25	45.25
No. 1, cast, Pittsburgh	26.50	26.50	26.50	63.75
No. 1, cast, Philadelphia	27.50	27.50	28.00	67.00
No. 1, cast, Chicago	29.50	29.50	27.50	70.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.25	$14.25	$14.25	$13.50
Foundry coke, prompt	16.25	16.25	16.25	16.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	16.00	16.00	17.625	21.50
Copper, Lake Conn.	18.625	18.625	18.625	21.625
Tin, Grade A, New York	$1.03	$1.03	$1.03	$1.03
Zinc, East St. Louis	9.00	9.00	10.75	12.00
Lead, St. Louis	11.85	11.85	11.85	17.30
Aluminum, virgin	17.00	17.00	17.00	16.00
Nickel, electrolytic	42.93	42.93	42.93	36.56
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	38.50	38.50	38.50	35.00

Composite Prices . .

Starting with the issue of May 12, 1949 the weighted finished steel composite was revised for the years 1941 to date. The weights used are based on the average product shipments for the 7 years 1937 to 1940 inclusive and 1946 to 1948 inclusive. The use of quarterly figures has been eliminated because it was too sensitive, see p. 139 of May 12, 1949 issue.

	FINISHED STEEL (Base Price)	PIG IRON	SCRAP STEEL
July 5, 1949	3.705¢ per lb.	$45.91 per gross ton	$19.33 per gross ton
One week ago	3.705¢ per lb.	$45.91 per gross ton	$19.33 per gross ton
One month ago	3.705¢ per lb.	$45.91 per gross ton	$21.67 per gross ton
One year ago	3.211¢ per lb.	$40.51 per gross ton	$40.91 per gross ton

	HIGH		LOW	
1949	3.720¢	Jan. 1	3.705¢	May 3
1948	3.721¢	July 27	3.193¢	Jan. 1
1947	3.193¢	July 29	2.848¢	Jan. 1
1946	2.848¢	Dec. 31	2.464¢	Jan. 1
1945	2.464¢	May 29	2.396¢	Jan. 1
1944	2.396¢		2.396¢	
1943	2.396¢		2.396¢	
1942	2.396¢		2.396¢	
1941	2.396¢		2.396¢	
1940	2.30467¢	Jan. 2	2.24107¢	Apr. 16
1939	2.35367¢	Jan. 3	2.26689¢	May 16
1938	2.58414¢	Jan. 4	2.27207¢	Oct. 18
1937	2.58414¢	Mar. 9	2.32263¢	Jan. 4
1936	2.32263¢	Dec. 28	2.05200¢	Mar. 10
1935	2.07642¢	Oct. 1	2.06492¢	Jan. 8
1934	2.15367¢	Apr. 24	1.95757¢	Jan. 2
1933	1.95578¢	Oct. 3	1.75836¢	May 2
1932	1.89196¢	July 5	1.83901¢	Mar. 1
1931	1.99626¢	Jan. 13	1.86586¢	Dec. 29
1929	2.31773¢	May 28	2.26498¢	Oct. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue and in May 12, 1949.

HIGH		LOW	
$46.82	Jan. 4	$45.91	May 10
46.91	Oct. 12	39.58	Jan. 6
37.98	Dec. 30	30.14	Jan. 7
30.14	Dec. 10	25.37	Jan. 1
25.37	Oct. 23	23.61	Jan. 2
$23.61		$23.61	
23.61		23.61	
23.61		23.61	
$23.61	Mar. 20	$23.45	Jan. 2
23.45	Dec. 23	22.61	Jan. 2
22.61	Sept. 19	20.61	Sept. 12
23.25	June 21	19.61	July 6
23.25	Mar. 9	20.25	Feb. 16
19.74	Nov. 24	18.73	Aug. 11
18.84	Nov. 5	17.83	May 14
17.90	May 1	16.90	Jan. 27
16.90	Dec. 5	13.56	Jan. 3
14.81	Jan. 5	13.56	Dec. 6
15.90	Jan. 6	14.79	Dec. 15
18.71	May 14	18.21	Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

HIGH		LOW	
$43.00	Jan. 1	$19.33	June 28
43.16	July 27	39.75	Mar. 9
42.58	Oct. 28	29.50	May 20
31.17	Dec. 24	19.17	Jan. 1
19.17	Jan. 2	18.92	May 22
19.17	Jan. 11	15.76	Oct. 24
$19.17		$19.17	
19.17		19.17	
$22.00	Jan. 7	$19.17	Apr. 10
21.83	Dec. 30	16.04	Apr. 9
22.50	Oct. 8	14.08	May 16
15.00	Nov. 22	11.00	June 7
21.92	Mar. 30	12.67	June 9
17.75	Dec. 21	12.67	June 8
13.42	Dec. 10	10.33	Apr. 29
13.00	Mar. 13	9.50	Sept. 25
12.25	Aug. 8	6.75	Jan. 3
8.50	Jan. 12	6.43	July 5
11.33	Jan. 6	8.50	Dec. 29
17.58	Jan. 29	14.08	Dec. 8

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. producing points in cents per pound unless otherwise indicated. Extras apply. (1) Widths up to 12-in. inclusive. (2) 0.25 carbon and less. (3) Cokes, 1.25 lb, deduct 25¢ per base box. (4) 18 gage and heavier. (5) For straight length material only from producers to fabricators. (6) Also shafting. For quantities of 40,000 lb and over. (7) Carload lot in manufacturing trade. (8) Hollowware enameling, gages 29 to 31 only. (9) Produced to dimensional tolerances in AISI Manual Sec. 6. (10) Slab prices subject to negotiation in most cases. (11) San Francisco only. (12) Los Angeles only. (13) San Francisco and Los Angeles only. (14) Seattle only. (15) Seattle and Los Angeles only.

PRODUCTS	Base prices at producing points apply to the sizes and grades produced in these areas														
	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		Detroit	Johnstown	Seattle, S. Frisco, LosAngeles	Fontana
INGOTS Carbon forging	$50.00											$50.00			
Alloy	$51.00						(per net ton)					$51.00			
BILLETS, BLOOMS, SLABS Carbon, rerolling[10]	$52.00				$52.00	$52.00	(per net ton)						$52.00		$71.00
Carbon forging billets	$61.00	$61.00	$61.00	$61.00	$61.00	$61.00	(per net ton)					$61.00	$61.00		$80.00
Alloy	$63.00	$63.00				$63.00	(Bethlehem, Canton, Massillon = $63.00) (per net ton)					$63.00			$82.00
PIPE SKELP	3.25						3.25				Warren = 3.25				
WIRE RODS	3.40	3.40		3.40	3.40		3.40	3.50			Worcester 3.70		3.40	4.05[11] 4.20[12]	
SHEETS Hot-rolled[4]	3.25	3.25	3.25	3.25	3.25	3.25 (Consho	3.25 hocken,	3.25 Pa. 3.35)		Warren, Ashland = 3.25		3.45		3.95[13]	4.15
Cold-rolled	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.20	4.00	Warren 4.00	4.20		Pittsburg, Cal. 4.95	4.90
Galvanized (10 gage)	4.40	4.40	4.40		4.40			4.40	Canton =4.40	4.40	Ashland =4.40			5.15[13]	
Enameling (12 gage)	4.40	4.40	4.40	4.40			4.40		4.60	4.40		4.70			
Long ternes (10 gage)	4.80		4.80							4.80					
STRIP Hot-rolled[1]	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25		3.25	Warren = 3.25	3.45		4.00 to 4.25	4.40
Cold-rolled[2]	4.00	4.15		4.00		4.00	4.00	4.00		New Haven 4.50 Warren = 4.00 to 4.25		4.20 to 4.25			4.90
TINPLATE Cokes, 1.50 lb.[3] base box	$7.75	$7.75	$7.75		$7.85			$7.85	$7.95	Warren, Ohio =$7.75				Pittsburg, Cal. =$8.50	
Electrolytic 0.25, 0.50, 0.75 lb. box	Deduct $1.30, $1.05 and 75¢ respectively from 1.50 lb. coke base box price														
TERNES MFG., special coated	Deduct $1.10 from 1.50 lb. coke base box price														
BLACKPLATE CANMAKING 55 to 128 lb.	Deduct $2.00 from 1.50 lb. coke base box price														
BLACKPLATE, h.e., 29 ga.[8]	5.30	5.30	5.30					5.40		Warren, Ohio =5.30					
BARS Carbon Steel	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35		3.35	Canton =3.35	3.55	3.35	4.05	4.00
Reinforcing[5]	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35			Canton =3.35		3.35	4.05 to 4.10	4.00
Cold-finished[6]	3.95 to 4.00	4.00	4.00	4.00		4.00	4.00					4.30			
Alloy, hot-rolled	3.75	3.75	3.75			3.75	3.75	Bethlehem, Canton, Massillon = 3.75				4.05	3.75	4.80[12]	4.75
Alloy cold-drawn	4.65	4.65	4.65	4.65		4.65	4.65	Massillon = 4.65			Worcester 4.95				
PLATE Carbon steel[9]	3.40	3.40	3.40	3.40	3.40 Cons	3.40 hohocken	3.40 =3.50	3.40 Coatesville = 3.50, Claymont = 3.50 Geneva = 3.40, Harrisburg = 3.50				3.85	3.40	4.30[14]	4.00
Floor plates	4.55	4.55		4.55				Conshohocken = 4.55							
Alloy	4.40	4.40							Coatesville = 4.50						
SHAPES, Structural	3.25	3.25	3.25		3.25	3.30	Bethlehem = 3.30, Geneva, Utah = 3.25						3.30	3.80 to 3.90[14]	3.80
MANUFACTURERS' WIRE[7] Bright	4.15	4.15		4.15	4.15		4.15	4.25	Duluth = 4.15, Worcester = 4.45				4.15	5.15[11]	
Spring (high carbon)	5.20	5.20		5.20				5.30	Worcester = 5.50 New Haven, Trenton = 5.50				5.20	Duluth = 5.20-8.15	
PILING, Steel sheet	4.05	4.05				4.05									

STAINLESS STEELS

Base prices, in cents per pound, f.o.b. producing point

Product	Chromium Nickel							Straight Chromium		
	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	12.75	13.50	15.00	15.50	22.75	18.25	20.00	11.25	13.75	11.50
Slabs, billets, rerolling	17.00	18.25	20.25	19.25	30.25	24.50	26.75	15.00	18.50	15.25
Forg. discs, die blocks, rings	30.50	30.50	33.00	32.00	49.00	36.50	41.00	24.50	25.00	25.00
Billets, forging	24.25	24.25	26.25	25.50	39.00	29.00	32.75	19.50	20.00	20.00
Bars, wire, structurals	28.50	28.50	31.00	30.00	46.00	34.00	38.50	23.00	23.50	23.50
Plates	32.00	32.00	34.80	34.00	50.50	39.50	44.00	26.00	26.50-27.00	26.50
Sheets	37.50	37.50	39.50	39.50	53.00	45.50	50.00	33.00	33.50	35.50
Strip, hot-rolled	24.25	25.75	30.00	27.75	46.00	34.50	38.75	21.25	28.00	21.75
Strip, cold-rolled	30.50	33.00	36.50	35.00	55.00	44.50	48.50	27.00	33.50	27.50

ELECTRODES

Cents per lb. f.o.b. plant, threaded electrodes with nipples, unboxed

Diameter in in.	Length in in.	
Graphite		
17, 18, 20	60, 72	16.00¢
8 to 16	48, 60, 72	16.50¢
7	48, 60	17.75¢
6	48, 60	19.00¢
4, 5	40	19.50¢
3	40	20.50¢
2½	24, 30	21.00¢
2	24, 30	23.00¢
Carbon		
40	100, 110	7.50¢
35	65, 110	7.50¢
30	65, 84, 110	7.50¢
24	72 to 104	7.50¢
17 to 20	84, 90	7.50¢
14	60, 72	8.00¢
10, 12	60	8.25¢
8	60	8.50¢

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	90.5¢
18	4	1	—	5	$1.42
18	4	2	—	—	$1.025
1.5	4	1.5	8	—	65¢
6	4	2	6	—	69.5¢

High-carbon-chromium ..... 52¢
Oil hardened manganese ..... 29¢
Special carbon ..... 26.5¢
Extra carbon ..... 22¢
Regular carbon ..... 19¢

Warehouse prices on and east of Mississippi are 2½¢ per lb higher. West of Mississippi, 4½¢ higher.

ELECTRICAL SHEETS

24 gage, HR cut lengths, f.o.b. mill

	Cents per lb
Armature	5.45
Electrical	5.95
Motor	6.70
Dynamo	7.50
Transformer 72	8.05
Transformer 65	8.60
Transformer 58	9.30
Transformer 52	10.10

RAILS, TRACK SUPPLIES

F.o.b. mill

Standard rails, 100 lb and heavier, No. 1 quality, per 100 lb ..... $3.20†
Joint bars, 100 lb 4.25
Light rails per 100 lb 3.55

	Base Price cents per lb
Track spikes	5.35
Axles	5.20
Screw spikes	8.00
Tie plates	4.05
Tie plates, Pittsburg, Calif.*	4.20
Track bolts, untreated	8.25
Track bolts, heat treated, to railroads	8.50

*Seattle, add 30¢
†CF&I, $3.30.

C-R SPRING STEEL

Base per pound f.o.b. mill

0.26 to 0.40 carbon ..... 4.00¢
0.41 to 0.60 carbon ..... 5.50¢
0.61 to 0.80 carbon ..... 6.10¢
0.81 to 1.05 carbon ..... 8.05¢
1.06 to 1.35 carbon ..... 10.35¢
Worcester, add 0.30¢.

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless clad		
No. 304, 20 pct, f.o.b. Coatesville, Pa.	*26.50	
Washington, Pa.	*26.50	*22.50
Claymont, Del	*26.50	
Conshohocken, Pa.		*22.50
Nickel-clad		
10 pct f.o.b. Coatesville, Pa.	27.50	
Inconel-clad		
10 pct, f.o.b. Coatesville	36.00	
Monel-clad		
10 pct, f.o.b. Coatesville	29.00	
Aluminized steel sheets		
Hot dip, f.o.b. Butler, Pa.		7.75

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. mill

	Base Column	*Pittsburg, Calif.*
Standard & coated nails*	103	123
Galvanized nails*	103	123
Woven wire fence†	109	132
Fence posts, carloads††	114	...
Single loop bale ties	106	130
Galvanized barbed wire**	123	143
Twisted barbless wire	123	...

* Pgh., Chi., Duluth; Worcester, 6 columns higher. † 15½ gage and heavier. ** On 80 rod spools, in carloads. †† Duluth only.

	Base per 100 lb	*Pittsburg, Calif.*
Annealed fence wire‡	$4.80	$5.75
Annealed, galv. fencing‡	5.25	6.20
Cut nails, carloads‡‡	6.75	...

‡ Add 30¢ at Worcester; 10¢ at Sparrows Pt.
‡‡ Less 20¢ to jobbers.

HIGH STRENGTH, LOW ALLOY STEELS

Mill base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dyn-alloy	HI Steel	Mayari R	Otis-coloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic Sharon*	Republic	Alan Wood	Inland	Bethle-hem	Jones & Laughlin	Youngs-town Sheet & Tube	Great Lakes Sharon*
Plates	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.45
Sheets									
Hot-rolled	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	5.15
Cold-rolled	6.05	6.05	6.05	.....	6.05	6.05	6.05	6.05	6.25
Galvanized	.....	6.75	.....	.....	.....	6.75	.....	.....	.....
Strip									
Hot-rolled	4.95	4.95	4.95	.....	4.95	4.95	4.95	4.95	5.15
Cold-rolled	.....	.....	6.05	.....	.....	6.05	6.05	6.05	6.25
Shapes	.....	4.95	.....	.....	4.95	5.05	4.95	4.95	.....
Beams	.....	4.95	.....	.....	.....	.....	.....	.....	.....
Bars									
Hot-rolled	5.10	5.10	5.10	.....	5.10	5.10	5.10	5.10	5.30
Bar shapes	.....	5.10	.....	.....	5.10	5.10	5.10	5.10	.....

* Sheets and strip.

PIPE AND TUBING

Base discounts, f.o.b. mills, Base price, about $200.00 per net ton.

STANDARD, THREADED AND COUPLED

	Black*	Galv.
Steel, buttweld		
½-in.	43 to 41	26½ to 24½
¾-in.	46 to 44	30½ to 28½
1-in.	48½ to 46½	33½ to 31½
1¼-in.	49 to 47	34 to 32
1½-in.	49½ to 47½	34½ to 32½
2-in.	50 to 48	35 to 33
2½ to 3-in.	50½ to 48½	35½ to 33½
Steel, lapweld		
2-in.	39½	26 to 24
2½ to 3-in.	43½ to 42½	28 to 27
3½ to 6-in.	46½ to 42½	31 to 27
Steel, seamless		
2-in.	38½ to 27	23 to 11½
2½ to 3-in.	41½ to 32½	26 to 17
3½ to 6-in.	43½ to 38½	28 to 23
Wrought Iron, buttweld		
⅛-in.	+20½	+47
¼-in.	+10½	+36
1 & 1¼ in.	+ 4½	+27
2-in.	— 1½	+23½
3-in.	— 2	+23
Wrought Iron, lapweld		
2-in.	+ 7½	+31
2½ to 3½-in.	+ 5	+26½
4-in.	list	+20½
4½ to 8-in.	+ 2	+22

EXTRA STRONG, PLAIN ENDS

Steel, buttweld		
⅛-in.	42 to 40	27 to 25
¼-in.	46 to 44	31 to 29
1-in.	48 to 46	34 to 32
1¼-in.	48½ to 46½	34½ to 32½
1½-in.	49 to 47	35 to 33
2-in.	49½ to 47½	35½ to 34½
2½ to 3-in.	50 to 48	36 to 34
Steel, lapweld		
2-in.	39½ to 38½	25 to 24
2½ to 3-in.	44½ to 42½	30 to 28
3½ to 6-in.	48 to 44	33½ to 31½
Steel, seamless		
2-in.	37½ to 32½	23 to 18
2½ to 3-in.	41½ to 36½	27 to 23
3½ to 6-in.	45	30½
Wrought Iron, buttweld		
⅛-in.	+16	+40
¼-in.	+ 9½	+34
1 to 2-in.	— 1½	+23
Wrought Iron, lapweld		
2-in.	+ 4½	+27½
2½ to 4-in.	— 5	+16
4½ to 6-in.	— 1	+20½

For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. *Fontana, Calif., deduct 11 points from figures in left column.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Prices per 100 ft at mill in carload lots, cut length 4 to 24 ft inclusive.

OD in In.	Gage BWG	Seamless H.R.	Seamless C.R.	Electric Weld H.R.	Electric Weld C.D.
2	13	$19.18	$22.56	$18.60	$21.89
2½	12	25.79	30.33	25.02	29.41
3	12	28.68	33.76	27.82	32.74
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78

CAST IRON WATER PIPE

Per net ton

6 to 24-in., del'd Chicago $95.70
6 to 24-in., del'd N. Y. ....$92.50 to 97.40
6 to 24-in., Birmingham 82.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less 109.30

Class "A" and gas pipe, $5 extra: 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. mill Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

	Pct Off List
½ in. & smaller x 6 in. & shorter	35
9/16 & ⅝ in. x 6 in. & shorter	37
¾ in. & larger x 6 in. shorter	34
All diam., longer than 6 in.	30
Lag, all diam over 6 in. longer	35
Lag, all diam x 6 in. & shorter	37
Plow bolts	47

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	35
9/16 to 1 in. inclusive	34
1⅛ to 1½ in. inclusive	32
1⅝ in. and larger	27

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifinished Hexagon Nuts

	USS	SAE
7/16 in. and smaller	..	41
½ in. and smaller	38	..
½ in. through 1 in.	..	39
9/16 in. through 1 in.	37	..
1⅛ in. through 1½ in.	35	37
1⅝ in. and larger	28	..

In full case lots, 15 pct additional discount.

Stove Bolts

Packages, nuts separate	$61.75
In bulk	70.00

Large Rivets

(½ in. and larger)

	Base per 100 lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$6.75
F.o.b. Lebanon, Pa.	6.75

Small Rivets

(7/16 in. and smaller)

	Pct off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	48

Cap and Set Screws

(In packages)

	Pct Off List
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	46
¾ to 1 in. x 6 in., SAE (1035), heat treated	35
Milled studs	19
Flat head cap screws, listed sizes	5
Fillister head cap, listed sizes	28

FLUORSPAR

Washed gravel fluorspar, f.o.b. cars, Rosiclare, Ill.

Effective CaF, Content:	Base price per net ton
70% or more	$37.00
60% or less	34.00

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports*)

	Per gross Ton
Old range, bessemer	$7.60
Old range, nonbessemer	7.45
Mesabi, bessemer	7.35
Mesabi, nonbessemer	7.20
High phosphorus	7.20

After Dec. 31, 1948, increases or decreases in Upper Lake freight, dock and handling charges and taxes thereon to be for the buyers' account.

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags	7.9¢ to 9.0¢
Domestic sponge iron, 98+% Fe, carload lots	9.0¢ to 15.0¢
Electrolytic iron, annealed, 99.5+% Fe	31.5¢ to 39.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe	48.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 microns, 98%, 99.8%+ Fe	90.0¢ to $1.75
Aluminum	27.00¢
Antimony	53.73¢
Brass, 10 ton lots	20.50 to 23.50¢
Copper, electrolytic	26.125¢
Copper, reduced	26.00¢
Cadmium	$2.40
Chromium, electrolytic, 99% min.	$3.50
Lead	18.50¢
Manganese	48.00¢
Molybdenum, 99%	$2.65
Nickel, unannealed	66.00¢
Nickel, spherical, minus 30 mesh, unannealed	68.00¢
Silicon	34.00¢
Solder powder	8.5¢ plus metal cost
Stainless steel, 302	75.00¢
Tin	$1.15 to $1.25
Tungsten, 99%	$2.90
Zinc, 10 ton lots	11.75 to 16.25¢

COKE

	Net Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$14.00 to $14.50
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	$16.00 to $16.50
Foundry, oven coke	
Buffalo, del'd	$22.95
Chicago, f.o.b.	20.40
Detroit, f.o.b.	19.40
New England, del'd	22.70
Seaboard, N. J., f.o.b.	22.00
Philadelphia, f.o.b.	20.45
Swedeland, Pa., f.o.b.	20.40
Plainesville, Ohio, f.o.b.	20.90
Erie, del'd	$21.50 to 23.50
Cleveland, del'd	22.45
Cincinnati, del'd	21.50
St. Paul, f.o.b.	23.50
St. Louis, del'd	20.98
Birmingham, del'd	18.66

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

Carloads, Per 1000

First quality, Pa., Ky., Mo., Ill. (except Salina, Pa., add $5)	$80.00
No. 1 Ohio	74.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	74.00
No. 2 Ohio	66.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	11.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$80.00
Childs, Pa.	84.00
Hays, Pa.	85.00
Chicago District	89.00
Western, Utah and Calif.	95.00
Super Duty, Hays, Pa., Athens, Tex.	$85.00 to 95.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	$13.75 to 14.00
Silica cement, net ton, bulk, Hays, Pa.	16.00
Silica cement, net ton, bulk, Ensley, Ala.	15.00
Silica cement, net ton, bulk, Chicago District	$14.75 to 15.00
Silica cement, net ton, bulk, Utah and Calif.	21.00

Chrome Brick

Per Net Ton

Standard chemically bonded, Balt., Chester	$69.00

Magnesite Brick

Standard, Balt. and Chester	$91.00
Chemically bonded, Balt. and Chester	80.00

Grain Magnesite

Std. ⅜-in. grains

Domestic, f.o.b. Balt. and Chester, in bulk, fines removed	$56.00 to 56.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines	$30.50 to 31.00
in sacks with fines	35.00 to 35.50

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk, Midwest, add 10¢: Missouri Valley, add 20¢ .. $12.25

WAREHOUSE PRICES

Base prices, f.o.b. warehouse, dollars per 100 lb.
(Metropolitan area delivery, add 15¢ to base price except Cincinnati and New Orleans (*), add 10¢; New York, add 20¢.)

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Baltimore	5.31	6.21-6.41	6.95-7.11	5.37	....	5.56	5.36	5.42	6.16	....	9.60-10.10	....	....
Birmingham	5.00	....	6.40	5.00		5.15	5.00	5.10	6.57	....	....	....	....
Boston	5.55	6.45-6.75	7.11-7.61	5.60-5.95	6.75	5.80	5.42	5.52	6.27	9.67-9.79	10.04-10.07	11.23	11.47
Buffalo	4.85	5.75	7.42-7.57	5.24	7.27	5.35	5.00	4.95-	5.40	9.30-	9.60-	10.65	10.95-
Chicago	4.85	5.75	6.95-7.10	4.85	5.55-6.68	5.10	4.90	4.90	5.70	8.90	9.26	10.25	10.55
Cincinnati*	5.16-5.51	5.84-6.28	6.59-6.93	5.28-5.43	....	5.53-5.85	5.33	5.33-5.48	6.08-6.20	9.74	9.99	11.19	11.44
Cleveland	4.85-5.16	5.75-6.06	6.15-7.46	5.03-5.15	....	5.21-5.54	5.01-5.47	5.01-5.34	5.70-5.97	9.49-9.50	9.74-9.75	10.95	11.19-11.20
Detroit	5.28-5.32	6.07-6.18	7.38-7.58	5.27-5.47	6.27-6.58	5.52-5.57	5.33-5.40	5.33-5.55	6.00-6.10	9.67	9.92	11.11	11.35
Houston	6.70-6.95	....	7.30	6.70	....	6.70	6.20-6.70	6.40-6.65	7.60	10.45	10.40	11.45	11.70
Indianapolis	5.29	6.13	7.44	5.29	7.36	5.54	5.34	5.34	6.14	11.25	11.39	....	....
Los Angeles	6.45	7.80[19]-7.90[1]	8.05	6.65	8.35[5]	6.15	5.95	6.10	7.95[14]	10.95[15]	10.90[15]-14.70	12.45[15]	12.70[15]-16.45
Memphis	5.75-5.80	6.60	7.20	5.80-5.95	6.80	5.95-6.00	5.75	5.75	6.53	....	....	....	....
Milwaukee	5.03	5.93	7.13-7.18	5.03-5.38	6.86	5.28	5.08	5.08	5.88	9.53	9.78	10.98	11.23
New Orleans*	5.95	6.75	....	6.15	....	6.15	5.95	5.95	6.65[6]	....	....	....	....
New York	5.40	6.31-6.46	6.90-7.00	5.62-5.72	....	5.70	5.33	5.57	6.36-6.41	9.28-9.73	9.58-9.98	11.18	11.43
Norfolk	6.00	....	....	6.20	....	6.05	6.05	6.05	7.05	....	....	....	....
Omaha	6.13	....	8.33	6.13	....	6.38	6.18	6.18	6.98	....	....	....	....
Philadelphia	5.08	6.24[13]	6.73	5.45	6.69	5.38	5.10	5.40	6.19	9.70	9.75	10.95	11.20
Pittsburgh	4.85	5.75[1]	6.90	5.00	6.00	5.05	4.90	4.90	5.65	8.90	9.20	10.25	10.55
Portland	6.50[8]-6.90	8.00[1]	8.80-9.10	6.85[8]	....	6.30[8]	6.35[8]	6.35[8]	8.25[14]	10.50[6]	10.10[6]	....	....
Salt Lake City	7.25[3]	8.20	8.80-9.30	7.65[3]	....	6.10[3]	5.70[3]	6.95[8]	8.30	....	....	....	....
San Francisco	6.15[8]-7.15	7.50[2]	7.90	6.75[8]	8.25[5]	6.30-6.35[8]	5.90[8]	5.90[8]	7.55	10.90[15]	10.85[15]	12.40[15]	12.65[15]
Seattle	6.70[4]-7.10	8.15[2]-8.65	8.80-9.30	6.70[4]	....	6.35[4]	6.30[4]	6.20[4]	8.15[14]	....	10.35[15]	....	13.10[15]
St. Louis	5.22-5.37	6.12[1]-6.27	7.32	5.22	6.68-7.54	5.47	5.27	5.27	6.07-6.22	9.27-9.72	9.57-9.97	10.62-11.17	10.92-11.42
St. Paul	5.44	6.19-6.34	7.54-7.64	5.44	6.82	5.64-6.69	5.49	5.49	6.29	9.49	9.79	10.84	11.14

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED:
Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED:
Sheets, 400 to 1499 lb strip, extras on all quantities bars 1000 lb and over.

ALLOY BARS:
1000 to 1999 lb.

GALVANIZED SHEETS:
450 to 1499 lb.

EXCEPTIONS:
(1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb; (18) 1000 to 1499 lb; (19) 1500 to 3499 lb.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight nor the 6 pct increase on total freight charges in the Eastern Zone (5 pct Southern Zone, 4 pct Western Zone), effective Jan. 11, 1949.

PRODUCING POINT PRICES

Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	48.00	....	....	....	....
Birmingham	38.88	39.38	....	....	....
Buffalo	46.00	46.50	47.00	....	....
Chicago	46.00	46.50	46.50	47.00	....
Cleveland	46.00	46.50	46.50	47.00	51.00
Duluth	46.00	46.50	46.50	47.00	....
Erie	46.00	46.50	46.50	47.00	....
Everett	....	50.00	50.50	....	....
Granite City	47.90	48.40	48.90	....	....
Ironton, Utah	46.00	46.50	....	....	....
Lone Star, Texas	46.00	46.50†	....	....	....
Neville Island	46.00	46.50	46.50	....	....
Geneva, Utah	46.00	46.50	....	....	....
Sharpsville	46.00	46.50	46.50	47.00	....
Steelton	48.00	48.50	49.00	49.50	54.00
Struthers, Ohio	46.00	....	....	....	....
Swedeland	48.00	48.50	49.00	49.50	....
Toledo	46.00	46.50	46.50	47.00	....
Troy, N. Y.	48.00	48.50	49.00	....	54.00
Youngstown	46.00	46.50	46.50	....	....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Producing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	....	50.00	50.50	....	....
Boston	Steelton	6.27	54.27	54.77	55.27	55.77	60.27
Brooklyn	Steelton	5.48	....	53.98	54.48	54.98	59.48
Cincinnati	Birmingham	6.09	44.97	45.47	....	....	....
Jersey City	Steelton	3.67	....	52.17	52.67	53.17	57.67
Los Angeles	Geneva-Ironton	7.13	53.13	63.63	....	....	....
Mansfield	Cleveland-Toledo	3.03	49.03	49.53	49.53	50.03	54.03
Philadelphia	Bethlehem	2.17	50.17	....	....	....	....
Philadelphia	Swedeland	1.31	49.31	49.81	50.31	50.81	....
Philadelphia	Steelton	2.81	50.81	51.31	51.81	52.31	56.81
San Francisco	Geneva-Ironton	7.13	53.13-	53.63-	....	....	....
Seattle	Geneva-Ironton	7.13	53.13-	53.63-	....	....	....
St. Louis	Granite City	0.75 Arb.	48.65	49.15	49.65	....	....
Gulf Ports	Lone Star, Texas	....	50.50	51.00†			

† Low Phos., Southern Grade.

Producing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct for foundry iron); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.01 to 6.50 pct. C/L per g.t., f.o.b. Jackson, Ohio —$59.50; f.o.b. Buffalo, $60.75. Add $1.00 per ton for each additional 0.50 pct Si up to 17 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $66.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, $73.78. High phosphorus charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size.

F.o.b. Birmingham	$174
F.o.b. Niagara Falls, Alloy, W. Va., Welland, Ont.	$172
F.o.b. Johnstown, Pa.	$174
F.o.b. Sheridan, Pa.	$172
F.o.b. Etna, Pa.	$175

$2.00 for each 1% above 82% Mn, penalty, $2.15 for each 1% below 78%.

Briquets—Cents per pound of briquet, delivered, 66% contained Mn.

Carload, bulk	10.45
Ton lots	12.05
Less ton lots	12.95

Spiegeleisen

Contract prices gross ton, lump, f.o.b.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Palmerton, Pa.	$64.00	$65.00
Pgh. or Chicago	65.00	66.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, packed	35.5
Ton lots	37.0

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	28
Ton lots	30
Less ton lots	32

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, delivered.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	25.25	27.10	28.30
0.10% max. C,	24.75	26.60	27.80
0.15% max. C	24.25	26.10	27.30
0.30% max. C	23.75	25.60	26.80
0.50% max. C	23.25	25.10	26.30
0.75% max. C, 7.00% max. Si	20.25	22.10	23.30

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.

Carload bulk	8.95
Ton lots	10.60
Briquet, contract basis carlots, bulk delivered, per lb of briquet	10.30
Ton lots	11.90
Less ton lots	12.80

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, $80.00; $78.50 f.o.b. Niagara Falls; Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.

96% Si, 2% Fe	20.70
97% Si, 1% Fe	21.10

Silicon Briquets

Contract price, cents per pound of briquet, bulk, delivered, 40% Si, 1 lb Si briquets.

Carload, bulk	6.30
Ton lots	7.90
Less ton lots	8.80

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size, bulk, in carloads, delivered.

25% Si	18.50
50% Si	11.30
75% Si	13.50
85% Si	14.65
90-95% Si	16.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads, delivered. (65-72% Cr, 2% max. Si)

0.06% C	28.75
0.10% C	28.25
0.15% C	28.00
0.20% C	27.75
0.50% C	27.50
1.00% C	27.25
2.00% C	27.00
65-69% Cr, 4-9% C	20.50
62-66% Cr, 4-6% C, 6-9% Si	21.35

Briquets — Contract price, cents per pound of briquet, delivered, 60% chromium.

Carload bulk	13.75
Ton lots	15.25
Less ton lots	16.15

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	21.60
Ton lots	23.75
Less ton lots	25.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

Carloads	27.75
Ton lots	30.05
Less ton lots	31.85

Chromium Metal

Contract prices, cents per lb chromium contained packed, delivered, ton lots. 97% min. Cr, 1% max. Fe.

0.20% max. C	1.09
0.50% max. C	1.05
9.00% min. C	1.04

Calcium—Silicon

Contract price per lb of alloy, lump, delivered.

30-33% Ca, 60-65% Si, 3.00% max. Fe.

Carloads	17.90
Ton lots	21.00
Less ton lots	22.50

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	19.25
Ton lots	21.55
Less ton lots	22.55

CMSZ

Contract price, cents per pound of alloy, delivered.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

Ton lots	19.75
Less ton lots	21.00

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots	15.75¢
Less ton lots	17.00¢

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11% Ca 5 to 7%.

Carload packed	17.00¢
Ton lots to carload packed	18.00¢
Less ton lots	19.50¢

SMZ

Contract price, cents per pound of alloy, delivered. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

Ton lots	17.25
Less ton lots	18.50

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, per pound contained W, 5 ton lots, delivered	$2.25
Ferrovanadium, 35-55%, contract basis, delivered, per pound, contained, V.	
Openhearth	$2.90
Crucible	3.00
High speed steel (Primos)	3.10
Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2O_5	$1.20
Ferrocolumbium, 50-60% contract basis, delivered, per pound contained Cb.	
Ton lots	$2.90
Less ton lots	2.95
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo.	$1.10
Calcium molybdate, 45-50%, f.o.b. Langeloth, Pa., per pound contained Mo.	96¢
Molybdenum oxide briquets, f.o.b. Langeloth, Pa.; bags, f.o.b. Wash., Pa., per pound contained Mo.	95¢
Ferrotitanium, 40%, regular grade, 10% C max., f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti	$1.28
Ferrotitanium, 25%, low carbon, f.o.b. Niagara Falls, N.Y., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti	$1.40
Less ton lots	1.45
Ferrotitanium, 15 to 19%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, carloads per net ton	$160.00
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton	$65.00
10 tons to less carload	75.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Ton lots	21.00¢
Zirconium, 12-15%, contract basis, lump, delivered, per pound of alloy.	
Carload, bulk	6.60¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	7.40¢
Ton lots	8.80¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Carload, bulk	11.00¢
Ton lots, packed	11.25¢
Less ton lots	11.75¢

Boron Agents

Contract prices per lb. of alloy, del.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D. Ton lot	$1.20
F.o.b. Wash., Pa.; 100 lb and over	
10 to 14% B.	.75
14 to 19% B.	1.20
19% min. B.	1.50
Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, delivered.	
Ton lots	$1.67
Less ton lots	1.79
Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.	
Less ton lots	$1.80
Silcaz, contract basis, delivered	
Ton lots	45.00¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.	
No. 1	93¢
No. 6	63¢
No. 79	45¢
Bortam, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢
Carbortam, f.o.b. Suspension Bridge, N. Y.; freight allowed, Ti 15-18%, B 1.00-1.50%, Si 2.5-3.0%, Al 1.0-2.0%.	
Ton lots, per pound	8.625¢
Borosil, f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B	$6.25

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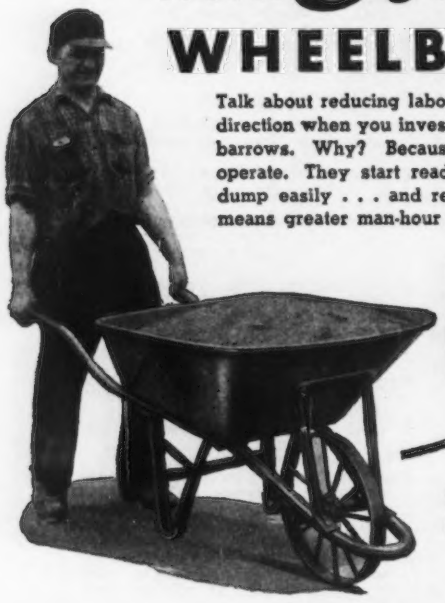

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(CONTINUED FROM PAGE 154)

plate waste and tin mill black plate rejects are also being offered for immediate delivery by Dominion Foundries & Steel Ltd. of Hamilton, Ont.

Although Isaacson is no longer producing steel ingots, company officials report that its structural operations are operating at better than its 100 pct rated capacity with some operations being transferred to various shops and facilities to expedite the work. Most of the activity is on structural members for bridges and buildings with the company's tower division just getting into full production.

Packaging Engineers Concerned at Mounting Loss to Goods in Transit

Chicago

• • • In 1948 50.3 pct of the damage to goods in transit handled on the nation's railroads was due to rough handling in transit. The Society of Industrial Packaging & Materials Handling Engineers is concerned over the mounting loss and damage figures and have greatly stepped up research and development in the field of protective packaging.

In a report made recently at the annual meeting of the board of directors of the society in Detroit, C. J. Carney, Jr., managing director of the society, stated that protective packaging and efficient handling of materials even within manufacturing plants are often absent in the most modern of manufacturing establishments.

The society has announced plans for its fourth annual Industrial Packaging & Materials Handling Exposition to be held in Detroit, Oct. 4-6. This professional group has shown a growth in membership from 25 in its initial chapter to its present membership of 1100 in 800 companies throughout the country. It is the society's aim during the coming year to report the specific developments in packaging and handling efficiencies on the broadest possible scale so as to enable manufacturers to achieve the greatest possible cost savings in these phases of production, as well as to show them how to better protect their goods in transit.